A STUDY OF KNOWLEDGE MANAGEMENT PRACTICES IN SMALL & MEDIUM SIZED ENTERPRISES OF PUNE DISTRICT

ABSTRACT
THESIS

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BY

M. LAVANYA

Under the Supervision of

Dr. (Mrs.) Salma Ahmed
Associate Professor
Department of Business Administration
Faculty of Mgt. Studies and Research
Aligarh Muslim University, Aligarh
(Internal Advisor)

Dr. M. Venkatesan
Associate Professor,
Indian Institute of Foreign Trade
New Delhi
(External Advisor)

DEPARTMENT OF BUSINESS ADMINISTRATION
FACULTY OF MANAGEMENT STUDIES AND RESEARCH
ALIGARH MUSLIM UNIVERSITY
ALIGARH, INDIA

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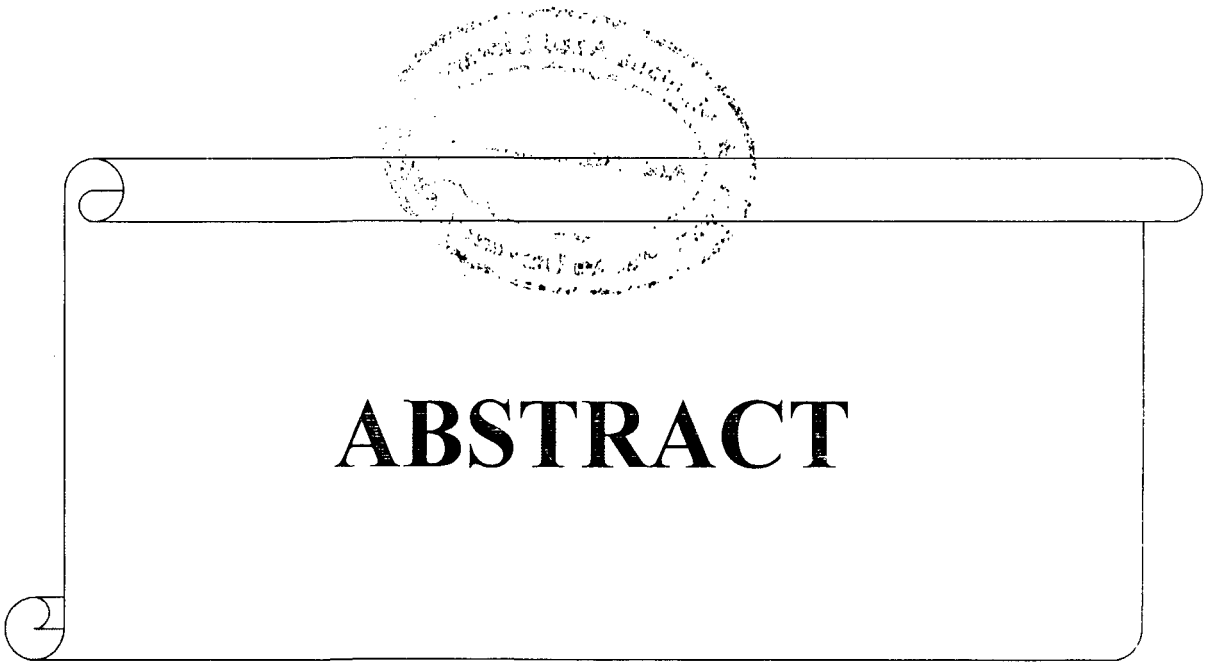

ABSTRACT

1. Introduction

'We are entering (or have entered) the knowledge society in which the basic economic resource ... is knowledge ... and where the knowledge worker will play a central role ...' Drucker (1993).

Knowledge is an intellectual asset for each organization. The organization must know how to utilize this intellectual asset to improve their business productivity and reduce costs. To get the most value from a company's intellectual assets, Knowledge Management practitioners maintain that knowledge must be shared and serve as the foundation for collaboration. Leveraging this knowledge within the organization gives a competitive edge. Intellectual capital, or employee knowledge and experience, is a vital corporate asset. KM seeks to best use that asset through knowledge sharing and documentation.

It is imperative to acknowledge the knowledge sharing activities to enhance day-to-day tasks in organization. This research study opens a room to explore the elements of knowledge management practices and its usage for better knowledge responsiveness. It demonstrates that knowledge management process and the way it is practiced is crucial and shall lead the organization to a better knowledge access and application of these for organizational effectiveness.

An increasing amount of studies are being conducted and published examining primary issues in relation to knowledge management practice and the element of human resource that are connected to it (Polanyi, 1966; Nonaka and Takeuchi, 1995; Davenport, 1998, Zack, 1999; Prusak, 2000). Consequently, the role of knowledge in organizational survival is considered as crucial factor in many organizations who understood the demand of knowledge economy. In the same way (Davenport and Prusak, 1998) research study found that knowledge is the only source of sustainable competitive advantage and (Senge 1990) states that an enterprise market value is increasingly dictated by its intellectual capital.

Knowledge management is a key concept in today's business world. Evidence of this fact is apparent if one only peruses the current business, management, and

organization literature. On the surface, it looks as if knowledge management just appeared toward the end of the 1990's. Some regard knowledge management as a business fad or craze (Swan, Newell, Scarbrough, and Hislop, 1999, p. 275), but a closer examination of the concept reveals that there has been considerable thought and research into it, and many of the world's most successful corporations, businesses, and organizations are investing considerable resources in this enterprise (Alvesson and Karreman, 2001, p. 995).

Knowledge is increasingly recognized as a key business imperative and has positive impacts for organizations in terms of efficiencies, effectiveness and competitiveness (Alavi and Leidner 2001, Grover and Davenport 2001). While there are many reasons for pursuing knowledge management (KM), many organizations contend that KM can lead to significant improvements in current operational performance, future capacity and adaptability to changing customers' needs and market conditions (Cross and Baird 2000, Earl 2001). Prior research and surveys conducted by business consultancies and research firms (Ezingeard, Liegh, and Chandler-Wilde 2000, KPMG 2000) also indicate that many organizations have already addressed KM as an integral part of their business agenda in a more rigorous and formal way than before. Research studies from various disciplines or with different perspectives demonstrate a growing interest towards KM and manifest multi-faceted concepts and ideas such as knowledge classification (Earl 2001, Holsapple and Joshi 2001), KM factors (APQC 2001, Holsapple and Joshi 2000), KM technology (Hahn and Subramani 1999, Marwick 2001) and KM strategy (Choi and Lee 2001, Zack 1999).

Prusak (1999) estimated that approximately 80% of the Global 1000 businesses are conducting knowledge projects, and that "approximately 68% of the Fortune 1000 have defined knowledge projects underway. Many of the practices set up in organizations can be broadly construed as contributing to the knowledge agenda. These knowledge projects range from setting up an intranet, using Lotus Notes or other team-oriented software, creating personal development plans, mentoring, or sharing information on best practices. Increasingly, organizations are creating specific initiatives or programs with a knowledge focus. Knowledge teams and knowledge leaders are emerging, but very few organizations are applying knowledge management throughout their organizations (Skyrme, 1999, p. 109).

Why are businesses and organizations devoting considerable money, time, and effort into knowledge management projects? The answer is they want to survive. McCampbell, et al (1999) maintain that in an economy of uncertainty, the only sure source of lasting competitive advantage is knowledge. "Successful companies are those that consistently create new knowledge, disseminate it widely throughout the organization, and quickly embody it in new technologies and products"(p. 172). They argue that the new business environment is characterized by radical and discontinuous change. The environment requires organization members to anticipate changes and carry out a faster cycle of knowledge creation and action based on the new knowledge (McCampbell et al., 1999, p. 173).

Operating any organization in the information age is a challenge made more difficult by the instantaneous nature of the flow of information. Drucker (1993) calls our world a post-capitalist society, and in his writing about the economic, political, and social transformation's taking place, he identifies a primary characteristic and resource – knowledge. The post-capitalist society differs from past eras in how knowledge is applied. In the early part of the 20th Century, the industrial revolution applied knowledge to the use of tools, processes and products. The productivity revolution began when people applied knowledge to human behavior. Post-capitalist society is characterized by the fact that knowledge is being applied to knowledge itself (Uit Beijerse, 1999, p. 96). As Skyrme and Amidon (1999) wrote, "the knowledge agenda is new, yet not new". Most organizations are already involved in managing knowledge and have been for a long time. Many of them, however, do not realize the full extent of what they are undertaking.

In today's knowledge era, not only it is a need for larger organizations but it is a need also for Small and Medium Enterprises to practice knowledge management process. The knowledge that is available within the organization are to be managed to improve organization efficiency. Such an environment and culture will deliberately and systematically help to share information and knowledge with each other which will reduce error, save valuable planning time, and better individual and organizational performance. Knowledge acquisition, knowledge storage, knowledge sharing and its application in problem solving and decision making processes not only help to deal

with environmental issues but also encourages new innovations to be created, shared, learned, enhanced, organized and utilized for the benefit of the organization to increase competency in the organization.

Why Knowledge Management?

Long before Knowledge Management became a term, the industrialist giant, Andrew Carnegie, said, "The only irreplaceable capital an organization possesses is the knowledge and ability of its people. The productivity of that capital depends on how effectively people share their competence with those who can use it." The author of modern management, Peter Drucker, wrote, "The basic economic resource—the means of production—is no longer capital, nor natural resources, nor labor. It is and will be knowledge." Even the genius of Charles Darwin makes the point, "It is not the strongest of the species that survive, nor the most intelligent, but the one most responsive to change." In this age, the only constant is change. Beside the well-known changes in technology, there are continuing changes politically, socially, and economically. The ability of an organization to stay current and stay relevant requires a core competence in Knowledge Management.

Knowledge Management can transform the organization to new levels of effectiveness, efficiency, and scope of operation. Through advancements in technology, data and information are readily available. The modern business manager can be able to discover and learn new measures, new technologies, and new opportunities, but this requires the ability to gather information in usable formats and disseminate knowledge to achieve the organization's objectives.

Knowledge Management is continually discovering what an organization knows—codifying tacit knowledge, Data Mining, and Business Intelligence; continually increasing what the organization knows—organizational learning and communities of practice, and continually organizing and disseminating explicit knowledge for use throughout the organization.

As organizations strive to improve their business performance and capacity for innovation, their attention is increasingly focused on how they manage knowledge. Experience has shown that successful KM implementations in business settings prioritize attention on soft issues - including human and cultural aspects, personal

motivations, change management methodologies, new and improved business processes enabling multidisciplinary knowledge sharing, communication and collaboration - and sees technology as an enabler.

Despite this, most efforts so far at addressing the challenge of KM in business environments have typically taken a "technology-push" approach, concentrating major effort on putting in place IT tools that will "solve the knowledge creation, sharing and reuse problem". Given this, it has been the objective of this guide to investigate those soft areas related to KM which can be the subject of common approaches, good practice identification or standardization initiatives, and to situate and describe these in the wider organizational context. The overall intention has been to provide meaningful and useful guidelines to companies, and notably SMEs, as to how they might align their organizations culturally and socially to take advantage of the opportunities of knowledge sharing within and beyond their organizational boundaries.

These guidelines therefore take the form of a European Guide to Good Practice in KM which describes how to implement KM successfully within an organization, and lists the benefits awaiting those organizations that are able to do it. Through its soft, culturally focused approach, the guide aims to add value to other more technology-focused initiatives underway within companies and standardization bodies.

The overall result will be a greater complementary benefit for the companies, large and small. Identifying and developing good practices can be applied to all types of businesses, including SMEs, to ensure that these organizations can be assisted as they seek to put in place the cultural, human and environmental ecology necessary to take full advantage of their collective knowledge as they do business in the knowledge economy.

Indian Small and Medium Enterprises and its Importance

Government of India has set up a new governing body for promotion and development of Micro, Medium and Small Scale Enterprises via "MSME Development Act", which came into force from 2nd October 2006. The President under Notification dated 9th May 2007 amended the Government of India (Allocation

of Business) Rules, 1961. by which, Ministry of Agro and Rural Industries (Krishi Evam Gramin Udyog Mantralaya) and Ministry of Small Scale Industries (Laghu Udyog Mantralaya) have been merged into a single Ministry, namely, "Ministry of Micro, Small and Medium Enterprises". It designed and implemented policies and programmes through its field organizations and attached offices for promotion and growth of MSME sector. The Office of the Development Commissioner (MSME) is an attached office of the Ministry of MSME, and is the apex body to advise, coordinate and formulate policies and programmes for the development and promotion of the MSME Sector. The office also maintains liaison with Central Ministries and other Central/State Government agencies/organizations financial institutions.

Definition of MSMEs in India

Micro, Small and Medium Enterprises have been recognized as one of the key sector for employment generation and overall economic development of our country. The Government of India has enacted the Micro, Small and Medium Enterprises Development (MSMED) Act, 2006 on June 16, 2006 which was notified on October 2, 2006. With the enactment of MSMED Act 2006, the paradigm shift that has taken place is the inclusion of the services sector in the definition of Micro, Small and Medium enterprises, apart from extending the scope to medium enterprises. The MSMED Act, 2006 has modified the definition of micro, small and medium enterprises engaged in manufacturing or production and providing or rendering of services. The Micro, Small and Medium Enterprises Development Act, 2006, was enacted to expand our focus to the entire gamut of micro, small and medium enterprises (MSMEs) both in manufacturing and service enterprises. This sector now provides employment to nearly 60 million persons and account for nearly 45 % of India's manufacturing output.

In India, the enterprises have been classified broadly into two categories:

(i) Manufacturing; and

(ii) Those engaged in providing / rendering of services.

Both categories of enterprises have been further classified into micro, small and medium enterprises based on their investments in plant and machinery (for manufacturing enterprises) or on equipment (in case of enterprises providing or

rendering services). The present ceiling on investments to be classified as micro, small or medium enterprises is as under:

Table 1.1: Present ceiling on investments for micro, small or medium enterprises

Classification	Investment Ceiling for Plant, Machinery or Equipment*	
	Manufacturing Enterprises	**Service Enterprises**
Micro	Upto Rs. 25 Lakh (Us $ 50 thousand)	Upto Rs. 10 Lakhs (US$ 20 Thousand)
Small	Above Rs. 25 Lakh (Us% 50 thousand)	Above Rs. 10 lakh (US $ 20 thousand)
Medium	Above Rs. 5 crore (US$ 1 million) and	Above Rs. 2 crore (US $ 0.40 million)
* Fixed costs are obviously higher		

Source: Micro, Small and Medium Enterprises Development (MSMED) Act, 2006

SME in India

The SME is a manifestation of India's socio-economic development model and has met with the country's long-term expectations in terms of contribution to GDP, industrial base, employment and exports. This segment forms a major part of India's industrial base. Recognizing the importance of SMEs in the industrial development of the country, the Government has taken initiatives which are important in facilitating the growth of the SMEs. But it will be the internal dynamics of industries, and the path India's industrial development takes that will give a thrust to the emergence of SMEs. The auto component industry is one such sector that would give a major boost to SMEs.

In developing countries, SMEs are the major source of income, a breeding ground for entrepreneurs and a provider of employment. With various definitions by various countries, sometimes it becomes a difficult task for an individual to understand the importance of a SME. One may not know the important role that SMEs play in developing any particular sector, economy of any country, alleviating poverty, increasing employment, and, above all providing various items of daily use at an affordable cost. Within the last few years many developed and developing countries have realized the importance of the sector. Fast decision making due to less staff and more control of an entrepreneur, availability of raw material at your door step,

innovative products which cater to the needs of a particular region and its vicinity, are certain key factors making SME's significant. Furthermore, economic factors which constitutes to the development of the sectors are as follows:

- Addition of output of goods and services to economy
- Low capital cost for establishment
- Reduction in income disparities
- Admirable propagation grounds for entrepreneurial talent

Year 2009 is a year to be remembered during the 21st century. The world has seen worst financial crisis in times gone by, making many developed and developing economies recreate a new policy in terms of managing crisis. In addition to that, increasing mercury of mother Earth has led to change in climatic conditions across the globe, inducing, wholesalers to re think about what worst perhaps come, and how by adapting some arduous measures, if applied, can give a better environment to our future generations to live in. SME's at their end, with innovative ideas helped to mitigate the situation. However, they lack in certain aspects. They are as follows:

- Technical Manpower
- Financial Aspect
- Technology Transfer
- Research and Development
- Lack of Education in terms of Policy, Labor Laws, Government Schemes

With the advent of planned economy from 1951 and the subsequent industrial policy followed by Government of India, both planners and Government earmarked a special role for small-scale industries and medium scale industries in the Indian economy. Due protection was accorded to both sectors, and particularly for small scale industries from 1951 to 1991, till the nation adopted a policy of liberalization and globalization. Certain products were reserved for small-scale units for a long time, though this list of products is decreasing due to change in industrial policies and climate.

SMEs always represented the model of socio-economic policies of Government of India which emphasized judicious use of foreign exchange for import of capital goods

and inputs; labour intensive mode of production; employment generation; no concentration of diffusion of economic power in the hands of few (as in the case of big houses); discouraging monopolistic practices of production and marketing; and finally effective contribution to foreign exchange earning of the nation with low import-intensive operations. It was also coupled with the policy of de-concentration of industrial activities in few geographical centers.

It can be observed that by and large, SMEs in India met the expectations of the Government in this respect. SMEs developed in a manner, which made it possible for them to achieve the following objectives:

- High contribution to domestic production
- Significant export earnings
- Low investment requirements
- Operational flexibility
- Location wise mobility
- Low intensive imports
- Capacities to develop appropriate indigenous technology
- Import substitution
- Contribution towards defense production
- Technology – oriented industries
- Competitiveness in domestic and export markets

In spite of the limitations, the SMEs have made significant contribution towards technological development and exports. SMEs have been established in almost all-major sectors in the Indian industry. As a result of globalization and liberalization, coupled with WTO regime, Indian SMEs have been passing through a transitional period. Those SMEs who have strong technological base, international business outlook, competitive spirit and willingness to restructure themselves shall withstand the present challenges and come out with shining colours to make their own contribution to the Indian economy.

SME in India – Auto Components firms

The liberalization of the Indian industry saw significant growth in the Indian Automotive Industry. Today, the Indian Automotive Industry is a significant contributor to the Indian economy, contributing nearly more than 5% to the country's GDP. With its wide penetration and strong influence on the country's economic and industrial development, the auto sector is indeed one of the major drivers of our economy. Moreover, economic liberalization coupled with its technological, cost and manpower advantage have made India one of the prime business destination for many global automotive players. With its strong influence on the country's economic and industrial development it is indeed one of the major drivers of our economy. Moreover, economic liberalization coupled with its technological, cost and manpower advantage have made India one of the prime business destination for many global automotive players. The sector has moderate direct employment and significant indirect employment; it is estimated that the sector provides direct and indirect employment to over 13 million people.

The Pre-1980s era was defined by a closed market, availability of outdated models and limited supply of vehicles leading to limited growth of the market. The industry was in its nascent stage without any significant players in the market and neither were there a significant base of customers. Automobiles were largely unaffordable and objects of desire for most people. This changed in the next few years of 1983 to 1993 wherein Maruti Udyog Limited entered the Indian Automotive Sector. The era saw the formation of several joint ventures in the space of commercial vehicles and auto components. With the de-licensing of the automotive sector in 1993, several global players entered the market as a consequence of which the market grew, leading to stiffer competition and a large variety of products for the customers to choose from - currently, the Indian customer has over 30 Auto Original Equipment Manufacturers (OEM's) to choose two wheelers, three wheelers and passenger vehicles.

The Indian auto component industry is a thrust sector in India. The direct employment generated by the medium and large firms in the organized sector is 250,000 man-years. Geographical spread of the industry in terms of location, over 70 percent of the automotive components companies are situated in either the northern or western

regions. NCR/ Delhi, Pune, and Chennai-Bangalore have traditionally been the most important clusters for the automotive components segment in India.

There are over 500 small, medium and large players in auto components in the organized sector along with 6,000 ancillary units. Most of these companies in India are family-owned businesses. The unorganized sector predominantly caters to the aftermarket. Manufacturers in this sector operate independently with little investment and on a small scale. Most components required by the Indian automobile industry are manufactured locally. Imported automotive components include special steels and materials or high precision engineering components, such as gearboxes etc.

The Auto component Statistics (value in US $ billion) according to ACMA describes the investment growth rate of this sector has gone up from 21% in 2004-05 to 33% and turnover 9in US $ bln) has increased from 6.7% in 2003-04 to 26% which shows a drastic improvement in the sector.

The Auto Components segment comprises of a host of products demanded by the Automobile segment. These products are classified by major functions which includes Engine and parts, transmission and steering parts, Suspension and braking parts, equipments, electrical parts and others.(ACMA, IMCS analysis). In terms of production of auto components, Engine and engine parts alone account for 31% of the production value of auto components, while Engine and engine parts and Transmission and steering parts stand next.

Auto component SMEs are one of the fastest growing within the SME category of industries. These units are key contributors to the total production of auto components and also have a significant share in the exports of the industry. As part of a highly fragmented industry, these companies mostly are part of the unorganized sector. They operate in a tier framework, and most of the companies in the SME segment are in the Tier II or below. Few of the suppliers to OEMs are medium scale enterprises. The SMEs are riding a boom phase, driven by demand from global auto manufacturers. The auto component firms has a maximum of three levels and the profile of people employed has experienced ITI's / workmen and few diploma holders in the supervisory level and further in the next level having workmen mainly

in 12th and below with few ITI's. The industry is undergoing a major restructuring and many existing companies are expected to move up in the value chain to a higher tier. Nevertheless, sustenance and survival still remains an issue of concern for these companies as they will have to absorb global best practices in this competitive environment.

Cost competitiveness, customer orientation, lead time, are some key factors the auto component SMEs will have to imbibe to survive in the new global set-up. At the same time, these companies face the limitations of being SMEs, like

- Low capital base
- Limited generation of surplus funds for re-investment due to tight working capital cycle
- Lack of awareness of business opportunities
- Inadequate exposure to international environment
- Limited geographical diversity of markets
- Obsolete Technology
- Poor infrastructure facilities

Despite these limitations, the SMEs have managed to significantly contribute towards development of India's industrial base. The key risks that the auto component SMEs face include:

- Fluctuations in the cost of production; especially raw materials like steel, aluminum, polymers
- Poor negotiation power due to fragmented nature of industry; which in turn limits their pricing power
- Dependence on traders and agents to access overseas markets which threatens their competitiveness
- Product substitutes due to fast-changing technology

Addressing these challenges and risks will be crucial to promoting SMEs in the auto component industry. The government has initiated cluster-based development – geographical concentration of enterprises having similar lines of business – which give rise to external economies and favour emergence of specialized technical,

administrative and financial services. This form of networking of small firms is a means of achieving economies of scale. Extending this initiative further, the government is encouraging banks to adopt a cluster-based lending approach to ease availability of funds to SMEs.

Entry of Multinational automobile manufacturers like Magna International of Canada, Delphi and Ford of US and some European companies into the Indian markets which bodes well for the auto component industry as it would enable the collective development of auto component SMEs. This has brought in better technology, skills, new products and an assured market. Strategic tie-ups and contract manufacturing is another way forward for SMEs in the auto component industry. The outlook for the industry is bright and is expected to continue on a high-growth trajectory for the next 10 years. Capitalizing on this growth prospect will mean keeping pace with global developments and imbibing capabilities that will give an edge to Indian SMEs in surviving this rapidly changing competitive environment.

Table 1.2 : Auto Component clusters in India

State	Numbers
Andhra Pradesh	1
Delhi	1
Gujarat	5
Haryana	3
Jharkhand	1
Karnataka	2
Maharashtra	5
Madhya Pradesh	1
Punjab	4
Tamil Nadu	1

Source-www.dnb.co.in

Industrial hubs within Pune

In the course of the geographical survey of the district, it is realized that there were distinct hubs of industrial activities within the district; Most of the manufacturing industries are concentrated in and around the Pimpri, Chinchwad and Bhosari MIDC. There are several smaller industrial hubs that have formed around this MIDC area; these are at Tathavade, Chikhali, Moshi, Khadki, Dighi, Nigdi etc. The second big

belt where the industry is concentrated is along the Pune-Chakan route. There is a high concentration of smaller players in places such as Moshi, Chimbli, Kuruli, Khed, Mahalunge etc. Similarly, there is a lot of industrial activity along the Pune-Mumbai belt with the presence of industries right from PCMC, Khadki, Dehu, Urse, Ambi, Talegaon, Kanhe, Takwe upto Lonavala. There is a presence of a lot of players at Pirangut and Urawade, very close to Chandni Chowk. The Pune-Nagar belt is also an active hub of manufacturing activities. The main areas with industrial activities are Kharadi, Wagholi, Koregaon Bhima, Sanaswadi right up to the MIDC at Ranjangaon. In fact, there almost exists a golden industrial triangle between PCMC, Talegaon and Ranjangaon within which industrial development seems to be taking place at a feverish pace. The other belt that has developed well within PMC limits is Mohammedwadi and Hadapsar. Pune-Satara Road stretching from Katraj, Khed Shivapur right upto Shirwal also has a fair mix of different industries.

Table 1.3: Main industrial activity in % of units in Pune District

Broad Areas	Percentage of units
PCMC	38.4%
Pune- Talegaon- Lonavala	8%
Pune-Alandi Markal- Moshi- Chakan	13.5%
Pune- Nagar Road- Ranjangaon	8%
Pune- Katraj- Khed Shivapur- Satara	4.5%
Hadapsar- Phursungi- Saswad	4%
Pirangut- Urawade	3%
Jejuri	0.8%
Baramati	1.9%
Kurkumbh	0.5%
Junnar	0.5%
City industrial estates and areas	12.2%

Source from - Industrial Directory of Pune, Mahratta Chamber of Commerce, Industries and Agriculture (2010)

The following are the locations where the main activity of manufacturing being carried out in Pune

Table 1.4: Manufacturing Activity in Pune District

Location	Area	Distance from	Main Activity
Pimpri-Chinchwad	1200	18 kms	Auto, auto-Components, M/c tools,
Hinjewadi Phase I		15 kms	IT, ITES
Hinjewadi Phase II		16 kms	BT
Kharadi		10 kms	Software
Talwade	190	18 kms	IT
Talegaon		37 kms	Floriculture
Ranjangaon		55 kms	White Goods
Chakan		30 kms	Auto and auto-components
Jejuri	118.37	48 kms	Mixed profile
Kurkumbh		75 kms	Chemicals Pharmaceuticals
Baramati		105 kms	Mixed profile

Source - Industrial Directory of Pune, Mahratta Chamber of Commerce, Industries and Agriculture (2009-10)

Based on the above facts this research focuses only on SME-auto components and concentrates on the Pimpri-Chinchwad and Chakan Industrial Area of Pune which is considered to be the biggest MIDC having the most of the auto components industries of Pune.

In summary, the discipline of knowledge management is now a well-established discipline in many large organizations. But what is its current status and role in needs in small and medium enterprises to be investigated. This research explores the above question and it is a survey of SMEs in Pune Region to exemplify the key knowledge management processes (1) knowledge capture and acquisition, (2) knowledge storage and preservation, and (3) knowledge sharing in the auto component firms. This research tries to understand the level of Knowledge Management followed in SMEs. It makes a study of adoption of the Knowledge Management process and practices in the strategic and operational levels of SMEs. It identifies whether a formal or structured approach of KM is being practiced in SMEs and explores to know to what extent information and communication technology is being used for knowledge capture and acquisition, knowledge storage and preservation, and knowledge sharing

and makes a comparative study of Knowledge Management Practices between SMEs and large auto component manufacturing organizations. It also proposes a framework model and strategy for Knowledge Management practice for SMEs in this sector.

This study also aims to examine the influence of KM enablers - Culture, Leadership, Employee participation, Rewarding with incentives, Training and technology, KM strategy and Information and Communications Technology (ICT) on KM processes such as knowledge capture and acquisition, knowledge storage and preservation, and knowledge sharing specifically in the auto component SMEs of Pune region. The findings of this study will be useful to SMEs, serving as a guideline to become more competitive. The findings of this study will be useful to SMEs, to discover and to further observe the importance of the above mentioned dimensions and KM processes within an organization in achieving sustainable competitive advantage in SMEs with high value-added growth potential.

2. Purpose of the Study

The purpose of study was to find out to what extent Knowledge Management process and practices was being adopted by SMEs. The study tries to identify how the Knowledge Management process and practices is being adopted in the strategic and operational levels of SMEs. It explores to assess to what extent information and communication technology is being used for knowledge acquisition, storage, distribution and preservation. It makes a relationship between KM strategy, KM infrastructure and ICT infrastructure with KM process. It further makes a comparative study of KM between SMEs and large organizations in the auto component sector with respect to the above mentioned dimensions. It also proposes better strategies and implications to the Industry for Knowledge Management practice in SMEs especially auto component firms.

3. Scope of the Research

The geographic area is limited to the SMEs of auto component manufacturing in Pune region to promote a homogeneous sample, and also large auto component

manufacturing were taken for comparison. The KM infrastructure, KM process, KM strategy and the ICT infrastructure are the components covered in this research.

4. Research Objectives

As discussed above, auto component SMEs could bring betterment by adopting a systematic KM practices and process. This study attempts to analyze these KM processes and how effectively it could be followed to enhance their day-to-day business activities.

The Study aims:

- To explore the level with which KM dimensions followed in SMEs.
- To study how the Knowledge Management process is being adopted in SMEs
- To study how the Knowledge Management practices is being adopted in SMEs
- To explore to what extent information and communication technology is being used for the process of knowledge acquisition, storage and preservation, and sharing.
- To make a comparative study between SMEs and Large auto component firms on various dimensions including KM Infrastructure, KM Strategy, and KM Process and ICT infrastructure.
- To suggest better strategies of KM practices to SMEs that may help them in becoming more competitive.

5. Data Sources

Primary as well as secondary data sources have been used in this research study. The primary data for this study have been collected from the auto component manufacturing firms of Pune District. The method of data collection from primary sources has been described in Section 3.10.5. For the secondary data, various studies were pursued from University of Pune library, British Library, Pune and for the SMEs and its structure and categories of Pune, Maharatta Chambers of Commerce Industries and Agriculture (MCCIA), Pune Chapter were contacted. Various national and international journals of KM Journal, Science Direct, Springer, Inderscience, Emerald online journals were referred which gave a more insight for the researcher in this study.

6. Development of Conceptual Model

The Conceptual model was developed based on the KM models given by various authors which has been listed and described in Chapter 2.14. The researcher has made an extensive review of literature to develop a conceptual model. The review was to understand the different KM dimensions that could be linked to frame a model especially with Indian context. This helped to identify four KM strategies, six KM Practices variables of Strategic level and five different KM infrastructure dimensions and three KM process dimensions of operational level. The following are the various dimensions used in this study:

Table 6.1: KM Strategy Dimensions

Dimension	Description
KM policy	a written policy or strategy that promotes KM being framed
KM plan	Has policies or programs intended to improve employee knowledge
KM Budget Allocation	Has allocated financial resources to support knowledge management initiatives
ICT investment	Has invested in information and communication technologies (i.e. intranet, database, email and digital libraries to facilitate knowledge management

Table 6.2: KM Practice variables at Strategic level

Dimension	Description
Organizational benefits	The organizational benefits of a knowledge-centric organization are clearly understood by the strategic level.
Top priority	Knowledge management is a top priority in our organization
Value system	Has a value system or culture intended to encourage knowledge sharing
Strategic partnerships	Uses partnerships or strategic alliances to acquire knowledge
KM initiatives	Has a clear and strong commitment to knowledge management initiatives
Rewarding system	Has reward systems for continuous learning or knowledge sharing

Operational Level focuses on the dimensions:

- Knowledge Management Infrastructure
- Information and communication Technology (ICT) Infrastructure
- Knowledge Management Process

Table 6.3: Knowledge Management Infrastructure dimensions

Dimension	Description
Culture	This described culture being followed among the employees with respect to knowledge management.
Employee Participation	This described attitude being followed among the employees with respect to knowledge management.
Leadership	This described leadership role being followed among the employees with respect to knowledge management.
Rewarding with Incentives	This described the rewarding support that the organization provides as an encouragement for implementing Knowledge Management.
Training and Mentoring	This described how training and mentoring being implemented as a part of KM

Table 6.4: Information and Communication Technology (ICT) Infrastructure dimensions

Dimension	Description and Elements
ICT Facility	This described what sort of Information and Communication Technology (ICT) facilities is provided to practice knowledge management.
ICT Usage	This described the ICT usage in KM Process

Table 6.5: Knowledge Management Process Dimensions

Dimension	Description
Knowledge Capture and Acquisition	This described the knowledge being captured or acquired by the employees.
Knowledge Storage and Preservation	This described knowledge being stored and preserved in the organization for future usage.
Knowledge Sharing	This described knowledge being shared or disseminated by the employees.

Based on the above described variables and dimensions the conceptual model was developed by the researcher which was tested in this study. The conceptual model describes the KM infrastructure dimensions such as Culture, Employee Participation, Leadership, Rewarding with Incentives and Training and Mentoring. KM Strategy dimensions which include KM policy, KM plan, KM budget allocation and ICT investment. ICT infrastructure comprises ICT facility and ICT usage. These are the independent variables tested against the dependent variable which is the KM Process dimensions that include Knowledge Acquisition and capture, Knowledge Storage & Preservation and Knowledge Sharing.

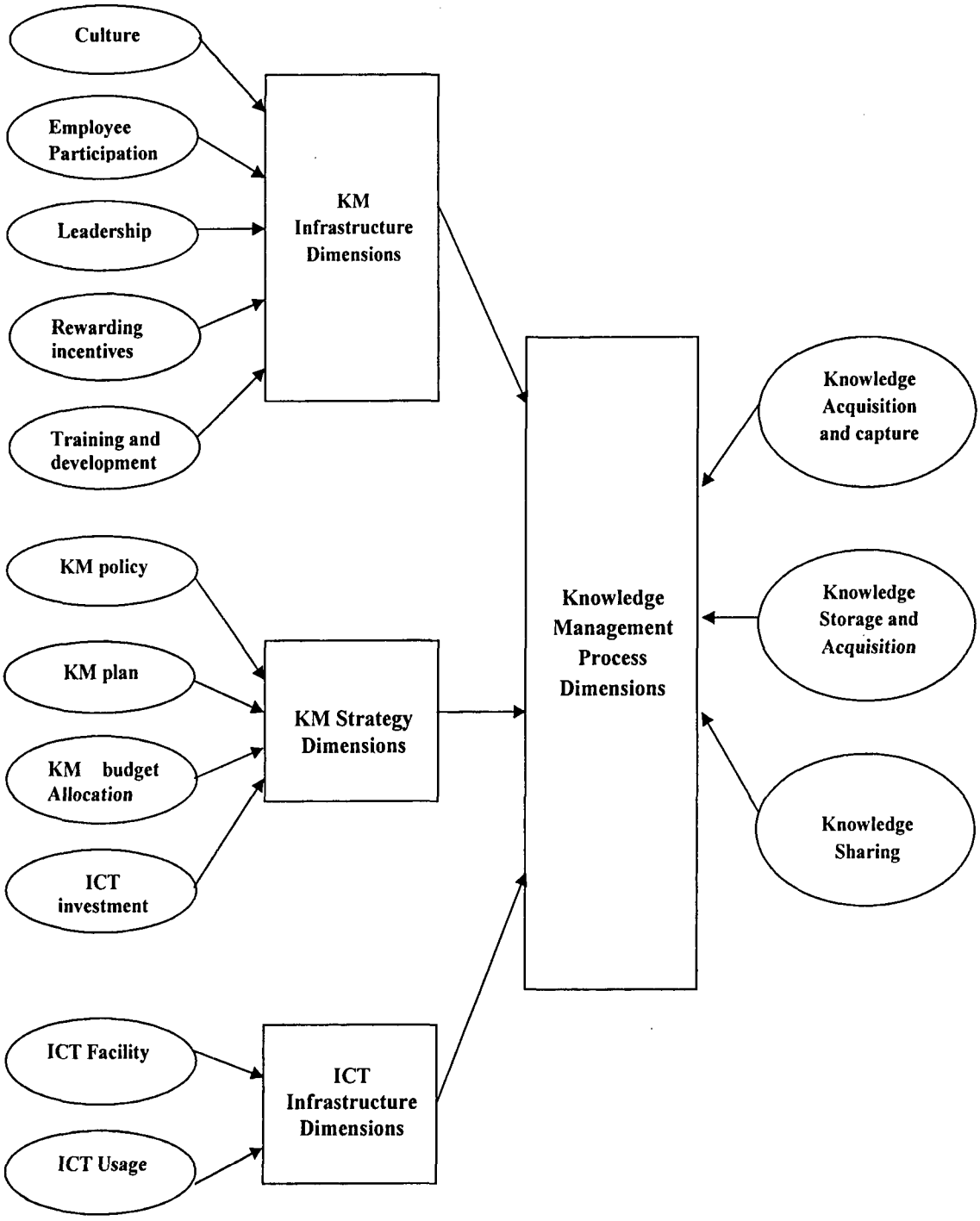

Figure 6.1: Conceptual Model (*Source: Developed by Researcher)*

7. Formulation of Research Hypotheses

For the present study, eight sets of hypothesis were formulated. There are forty-nine hypotheses in all. The First set comprises of two hypotheses formulated on the basis of KM dimensions across management levels which is the strategic and operational level respectively. Second set comprises of fifteen hypotheses based on the impact of KM infrastructure on KM process, Third set consists of twelve hypotheses based on the impact of KM strategy on KM process. Fourth set comprises of six hypotheses based on the impact of ICT infrastructure on KM process, Fifth set depicts the comparison between SMEs and large auto component firms based on KM infrastructure consisting of five hypotheses, Sixth set consists of four hypotheses based on comparison of SMEs with large firms with respect to KM strategy, Seventh set depicts three hypotheses on comparison of SMEs with large on KM process and lastly two hypotheses on comparison of SMEs and large on ICT infrastructure dimensions.

7.1 KM Dimensions across Management Levels

$H_0$1: There is no significant difference in KM practices being practiced between high and low responses of strategic levels of SMEs

$H_1$1: There is a significant difference in KM practices being practiced between high and low responses of strategic levels of SMEs

$H_0$2: There is no significant difference in KM practices being practiced between high and low responses of operational level of SMEs.

$H_1$2: There is no significant difference in KM practices being practiced between high and low responses of operational level of SMEs.

7.2 Impact of KM Infrastructure Dimensions on KM Process

$H_0$3: There is no significant impact of culture as a dimension of KM infrastructure on knowledge acquisition and capture.

$H_1$3: There is a significant impact of culture as a dimension of KM infrastructure on knowledge acquisition and capture.

$H_0$4: There is no significant impact of employee participation as a dimension of KM infrastructure on knowledge acquisition and capture.
$H_1$4: There is a significant impact of employee participation as a dimension of KM infrastructure on knowledge acquisition and capture.

$H_0$5: There is no significant impact of leadership as a dimension of KM infrastructure on knowledge acquisition and capture.
$H_1$5: There is a significant impact of leadership as a dimension of KM infrastructure on knowledge acquisition and capture

$H_0$6: There is no significant impact of rewarding with incentives as a dimension of KM infrastructure on knowledge acquisition and capture
$H_1$6: There is significant impact of rewarding with incentives as a dimension of KM infrastructure on knowledge acquisition and capture

$H_0$7: There is no significant impact of training and mentoring as a dimension of KM infrastructure on knowledge acquisition and capture
$H_1$7: There is a significant impact of training and mentoring as a dimension of KM infrastructure on knowledge acquisition and capture

$H_0$8: There is no significant impact of culture as a dimension of KM infrastructure on knowledge storage and preservation.
$H_1$8: There is a significant impact of culture as a dimension of KM infrastructure on knowledge storage and preservation.

$H_0$9: There is no significant impact of employee participation as a dimension of KM infrastructure on knowledge storage and preservation.
$H_1$9: There is a significant impact of employee participation as a dimension of KM infrastructure on knowledge storage and preservation.

$H_0$10: There is no significant impact of leadership as a dimension of KM infrastructure on knowledge storage and preservation.
$H_1$10: There is a significant impact of leadership as a dimension of KM infrastructure on knowledge storage and preservation.

$H_0$11: There is no significant impact of rewarding with incentives as a dimension of KM infrastructure on knowledge storage and preservation.
$H_1$11: There is a significant impact of rewarding with incentives as a dimension of KM infrastructure on knowledge storage and preservation.

$H_0$12: There is no significant impact of training and mentoring as a dimension of KM infrastructure on knowledge storage and preservation.
$H_1$12: There is a significant impact of training and mentoring as a dimension of KM infrastructure on knowledge storage and preservation.

$H_0$13: There is no significant impact of culture as a dimension of KM infrastructure on knowledge sharing.
$H_1$13: There is a significant impact of culture as a dimension of KM infrastructure on knowledge sharing.

$H_0$14: There is no significant impact of employee participation as a dimension of KM infrastructure on knowledge sharing.
$H_1$14: There is a significant impact of employee participation as a dimension of KM infrastructure on knowledge sharing.

$H_0$15: There is no significant impact of leadership as a dimension of KM infrastructure on knowledge sharing.
$H_1$15: There is a significant impact of leadership as a dimension of KM infrastructure on knowledge sharing.

$H_0$16: There is no significant impact of rewarding with incentives as a dimension of KM infrastructure on knowledge sharing.
$H_1$16: There is a significant impact of rewarding with incentives as a dimension of KM infrastructure on knowledge sharing.

$H_0$17: There is no significant impact of training and mentoring as a dimension of KM infrastructure on knowledge sharing.

H_I17: There is a significant impact of training and mentoring as a dimension of KM infrastructure on knowledge sharing.

7.3 Impact of KM Strategy Dimensions on KM Process

H_018: There is no significant impact of KM policy as a dimension of KM Strategy on knowledge acquisition and capture.

H_I18: There is a significant impact of KM policy as a dimension of KM Strategy on knowledge acquisition and capture.

H_019: There is no significant impact of KM plan as a dimension of KM Strategy on knowledge acquisition and capture.

H_I19: There is a significant impact of KM plan as a dimension of KM Strategy on knowledge acquisition and capture.

H_020: There is no significant impact of KM budget allocation as a dimension of KM Strategy on knowledge acquisition and capture.

H_I20: There is a significant impact of KM budget allocation as a dimension of KM Strategy on knowledge acquisition and capture.

H_021: There is no significant impact of ICT investment as a dimension of KM Strategy on knowledge acquisition and capture.

H_I21: There is a significant impact of ICT investment as a dimension of KM Strategy on knowledge acquisition and capture.

H_022: There is no significant impact of KM policy as a dimension of KM Strategy on knowledge storing and preservation.

H_I22: There is a significant impact of KM policy as a dimension of KM Strategy on knowledge storing and preservation.

H_023: There is no significant impact of KM plan as a dimension of KM Strategy on knowledge storing and preservation.

H_I23: There is a significant impact of KM plan as a dimension of KM Strategy on knowledge storing and preservation.

$H_0$24: There is no significant impact of KM budget allocation as a dimension of KM Strategy on knowledge storing and preservation.
$H_1$24: There is a significant impact of KM budget allocation as a dimension of KM Strategy on knowledge storing and preservation.

$H_0$25: There is no significant impact of ICT investment as a dimension of KM Strategy on knowledge storing and preservation.
$H_1$25: There is a significant impact of ICT investment as a dimension of KM Strategy on knowledge storing and preservation.

$H_0$26: There is no significant impact of KM policy as a dimension of KM Strategy on knowledge sharing.
$H_1$26: There is a significant impact of KM policy as a dimension of KM Strategy on knowledge sharing.

$H_0$27: There is no significant impact of KM plan as a dimension of KM Strategy on knowledge sharing.
$H_1$27: There is a significant impact of KM plan as a dimension of KM Strategy on knowledge sharing.

$H_0$28: There is no significant impact of KM budget allocation as a dimension of KM Strategy on knowledge Sharing.
$H_1$28: There is a significant impact of KM budget allocation as a dimension of KM Strategy on knowledge sharing.

$H_0$29: There is no significant impact of ICT investment as a dimension of KM Strategy on knowledge sharing.
$H_1$29: There is a significant impact of ICT investment as a dimension of KM Strategy on knowledge sharing.

7.4 Impact of ICT Infrastructure Dimensions on KM Process

$H_0$30: There is no significant impact of ICT facility as a dimension of ICT infrastructure on knowledge acquisition and capture.

$H_1$30: There is a significant impact of ICT facility as a dimension of ICT infrastructure on knowledge acquisition and capture.

$H_0$31: There is no significant impact of ICT usage as a dimension of ICT infrastructure on knowledge acquisition and capture.
$H_1$31: There is a significant impact of ICT usage as a dimension of ICT infrastructure on knowledge acquisition and capture.

$H_0$32: There is no significant impact of ICT facility as a dimension of ICT infrastructure on knowledge storage and preservation
$H_1$32: There is a significant impact of ICT facility as a dimension of ICT infrastructure on knowledge storage and preservation

$H_0$33: There is no significant impact of ICT usage a dimension of ICT infrastructure on knowledge storage and preservation
$H_1$33: There is a significant impact of ICT usage as a dimension of ICT infrastructure on knowledge storage and preservation

$H_0$34: There is no significant impact of ICT facility as a dimension of ICT infrastructure on knowledge sharing
$H_1$34: There is a significant impact of ICT facility as a dimension of ICT infrastructure on knowledge sharing

$H_0$35: There is no significant impact of ICT usage as a dimension of ICT infrastructure on knowledge sharing
$H_1$35: There is a significant impact of ICT usage as a dimension of ICT infrastructure on knowledge sharing

7.5 Comparison of SMEs with Large on KM Infrastructure Dimensions

$H_0$36: There is no significant difference on culture as a dimension of KM infrastructure among SMEs and large organizations.
$H_1$36: There is a significant difference on culture as a dimension of KM infrastructure among SMEs and large organizations.

$H_0$37: There is no significant difference on employee participation as a dimension of KM infrastructure among SMEs and large organizations.
$H_1$37: There is a significant difference on employee participation as a dimension of KM infrastructure among SMEs and large organizations.

$H_0$38: There is no significant difference on leadership as a dimension of KM infrastructure among SMEs and large organizations.
$H_1$38: There is a significant difference on leadership as a dimension of KM infrastructure among SMEs and large organizations.

$H_0$39: There is no significant difference on rewarding with incentives as a dimension of KM infrastructure among SMEs and large organizations.
$H_1$39: There is a significant difference on rewarding with incentives as a dimension of KM infrastructure among SMEs and large organizations.

$H_0$40: There is no significant difference on training and mentoring as a dimension of KM infrastructure among SMEs and large organizations.
$H_1$40: There is a significant difference on training and mentoring as a dimension of KM infrastructure among SMEs and large organizations.

7.6 Comparison of SMEs with Large on KM Strategy Dimensions

$H_0$41: There is no significant difference of KM policy as a dimension of KM strategy among SMEs and large organizations.
$H_1$41: There is a significant difference of KM policy as a dimension of KM strategy among SMEs and large organizations.

$H_0$42: There is no significant difference of KM plan as a dimension of KM strategy among SMEs and large organizations.
$H_1$42: There is a significant difference of KM plan as a dimension of KM strategy among SMEs and large organizations.

$H_0$43: There is no significant difference of KM budget allocation as a dimension of KM strategy among SMEs and large organizations.

$H_1$43: There is a significant difference of KM budget allocation as a dimension of KM strategy among SMEs and large organizations.

$H_0$44: There is no significant difference of ICT investment as a dimension of KM strategy among SMEs and large organizations.
$H_1$44: There is a significant difference of ICT investment as a dimension of KM strategy among SMEs and large organizations.

7.7 Comparison of SMEs with Large on KM Process Dimensions

$H_0$45: There is no significant difference of knowledge acquisition and capture as a dimension of KM Process among SMEs and large organizations.
$H_1$45: There is a significant difference of knowledge acquisition and capture of KM Process among SMEs and large organizations.

$H_0$46: There is no significant difference of knowledge storage and preservation as a dimension of KM process among SMEs and large organizations.
$H_1$46: There is a significant difference of knowledge storage and preservation as a dimension of KM process among SMEs and large organizations.

$H_0$47: There is no significant difference of knowledge sharing as a dimension of KM process among SMEs and large organizations.
$H_1$47: There is a significant difference of knowledge sharing as a dimension of KM process among SMEs and large organizations.

7.8 Comparison of SMEs with Large on ICT Infrastructure Dimensions

$H_0$48: There is no significant difference of ICT facility as a dimension of ICT infrastructure among SMEs and large organizations.
$H_1$48: There is a significant difference of ICT facility as a dimension of ICT infrastructure among SMEs and large organizations.

$H_0$49: There is no significant difference of ICT usage as a dimension of ICT infrastructure among SMEs and large organizations.
$H_1$49: There is a significant difference of ICT usage as a dimension of ICT infrastructure among SMEs and large organizations.

8. Research Design

This research design of this research study has two major phases:

Phase I –***Descriptive Research design*** in which a conceptual model was developed covering the different dimensions of the study.

Phase II – ***Cause-effect based Expost facto research design*** was used. The term ex post facto according to Landman (1988: 62) is used to refer a study that attempts to discover the pre-existing causal conditions between groups.

The following procedures when conducting ex post facto-research:

- The first step should be to state the problem.
- Following this is the determination of the group to be investigated. Two groups of the population that differ with regard to the variable should be selected in a proportional manner for the test sample.
- Groups, according to variables, are set equal by means of paring off and statistical techniques of identified independent and dependent variables.
- Data is collected. Techniques like questionnaires, interviews, literature search etc. are used to determine the differences.
- Next follows the interpretation of the research results. The hypothesis is either confirmed or rejected.(Jacobs et al. (1992: 81)). The researcher attempts to discover causes even when they cannot control the variables

The research technique employed in this study was ***Questionnaire-based survey.*** This survey is an established approach to get the respondent's opinion on a range of issues related to a research problem. This research was used to gain an insight, in terms of breadth as well as depth, regarding the KM practices adopted by auto components firms of Pune District. Further, a comparative study was done based on the different dimensions with respect to SMEs and large firms.

9. Questionnaire Development

9.1 Pilot Study

The questionnaire was designed after reviewing the previous available literature and studies pertaining to KM. Many executives, academicians and researchers were questioned to get a clear picture of what they perceived to be effective instructional design principles for KM. A pilot study was conducted among selected companies which aimed to refine the existing questions to get a good clarity. It was done to get feedback from the participants and to remove the questions which were of limited significance.

9.2 Final Questionnaire

Two different sets of questionnaires one for the Strategic / top level executives which focuses on the strategic support and practice on knowledge management of top level and other for the operations level to know the KM practices implemented which has been examined. The questionnaire was framed with closed type questions in a five-point Likert-scale style format as Strongly Agree, Agree, Can't say / Don't Know, Disagree, Strongly Disagree.

Table 9.1: Five point Likert-Scale as measurement scale

Value	Meaning Assigned
Strongly Agree (SA)	You are in agreement with the statement to a very high extent
Agree (A)	You believe that statement is true to some extent
Don't know/Can't say (DK/CS)	You do not know about it or cannot say
Disagree (D)	You believe that statement is not true to some extent
Strongly Disagree (SD)	You totally disagree with the statement

The strategic level had two sections. Section A dealt with organization profile and personal profile of the respondents. Section B dealt with KM practice variables and KM Strategy.

The operational level consisted of four sections. Section A had organization profile and personal profile of the respondents Section B dealt with KM infrastructure

dimensions such as culture, employee participation, leadership, rewarding with incentives and training and mentoring being followed. Section C consisted of ICT infrastructure dimensions which had ICT facility and its usage and the lastly section D dealt with KM process dimensions which are followed in the organizations having components like knowledge acquisition and capture, knowledge storage and preservation and knowledge sharing.

9.3 Structure and Content validity of the questionnaire

The questionnaire was tested for content and construct validity.

Content Validity- An instrument has content validity if it has measurement items that adequately cover the content domains or aspects of the concept being measured (Ahire et al., 1996). It is not assessed numerically, but can only be subjectively judged by the researchers (Saraph et al.,1989; Gotzamani and Tsiotras, 2001). Refers to the extent to which the content of items represents the entire body of content to be measured. The instrument used in this study has been framed after careful and extensive review of the relevant literature. The questionnaire is validated with the experts for their opinion and consultation so as to remove some of the items which were not fit according to the specialist in the field of management.

Construct Validity- Construct Validity is used to ensure that the measure is actually measure what it is intended to measure (i.e. the construct), and not other variables.
First of all,

- Field work was done at different sites before starting data collection. Thereby got into the normal work procedures from the company and got a better understanding of which data sources to select and which questions to be further included in questionnaire. It was important to do this test because this study was done to understand the level of KM practices among two different levels of management who differ in the level of thinking, nature of work that they do, educational background, experiences, etc.

9.4 Reliability Analysis

The degree of consistency between two measures of the same thing. (Mehrens and Lehman, 1987). • The measure of how stable, dependable, trustworthy, and consistent a test is in measuring the same thing each time (Worthen et al., 1993). The Cronbach alpha coefficient was used to estimate the internal consistency and reliability of a measure. A generally agreed lower limit of the Cronbach's alpha coefficient is 0.7 Nunnally(1978).

Table 3.7: Reliability Analysis

Dimensions	Number of Items	Cronbach's Alpha
KM at strategic level	10	**0.84**
KM at operational level		
Culture	10	**0.79**
Employee Participation	12	**0.83**
Leadership	8	**0.85**
Rewarding with incentives	2	**0.69**
Training and Mentoring	10	**0.88**
ICT facility	11	**0.92**
ICT usage	9	**0.86**
Knowledge Capture and Acquisition	11	**0.91**
Knowledge Storage and Preservation	8	**0.90**
Knowledge Sharing	17	**0.93**

The above summarizes the results of the reliability analysis of the study for each dimension. As can be seen, the Cronbach alpha values for the factors ranged approximately between 0.70 and 0.92. This provides evidence that all the dimensions have high internal consistency, and are thus reliable. Generally, alpha values greater than 0.7 are regarded as sufficient (Nunnally, 1994; Cuieford, 1965), although a cut-off value of 0.6 was used by researchers such as Black and Porter (1996), Rungasamy et al. (2002) and Antony et al. (2002).

10 Questionnaire Administration

Administration of questionnaire was done in order to collect relevant data from the sources. The target population was analyzed and samples were drawn accordingly.

10.1 Target Respondents

Respondents belong to auto components manufacturing sector and related services. Those organizations which were registered under Maharatta Chambers of Commerce Industries and Agriculture (MCCIA), Pune chapter form the population. These were 325 SMEs and 29 large Auto component firms.

10.2 Sampling Technique

Stratified Sampling technique was used to select the companies as there were two categories of companies being grouped based on the investment slabs - Small and medium (SMEs) and large auto component firms. For the selection of respondents, stratified technique was used as the respondents were categorized into executives and non-executives based on the management levels. Further selection of respondent firms and respondents were based on researcher's judgement.

The respondents were classified on the basis of their position employed in Strategic or Operational level. Respondents from Strategic level were Top executives, CEO, Plant manager, General Managers, and managers. In SMEs top executives were the proprietors. Respondents from operational level were non-executives at supervisory level with the designations of supervisors, engineers and technicians etc.

10.3 Sample Size

Out of 325 organizations, the researcher contacted 60% of the population which is significantly higher than 20% which is a accepted norm for any survey based research. A response rate of 20% and above is considered to be desirable for survey findings. (Yu and Cooper, 1983). Malhotra and Grover (1988) have also suggested a response rate of 20% for positive assessment of the surveys. This was done on the assumption some would not respond and some of the filled in questionnaire might not be usable. Selection of these 60% (180 firms) was based on the researcher's

judgment. Similarly the researcher selected 60% (18 firms) of large firms were as judgmental sampling.

In total 132 filled in questionnaires were received from 66 SMEs and 13 large firms and taken for data analysis. This gave an overall response rate of 40.61% among both SMEs and large firms. Rest of the questionnaires was received back because the organizations did not show much of interest in responding for the survey. Also other questionnaires were incomplete or inadequate to be included in the survey hence discarded.

10.4 Data Collection Method

This survey was conducted during December 2010 to August 2011. Officially CD and the Industrial directory of Pune from MCCIA, Pune was collected. There were 325 Small and Medium Enterprises (SMEs) and 29 large auto component organizations which were registered under MCCIA, Pune. The organizations in Pimpri-Chinchwad MIDC, Chakan, Bhosari MIDC were personally contacted by getting a prior appointment from HR managers or through references and were collected personally. E-mails were also sent to the concerned references to get the questionnaire filled.

11 Tools of Analysis

This research study has used the questionnaire developed by the researcher as an instrument to collect the data. The data collected was analyzed using statistical tool SPSS 17.0. Using SPSS, different tests were conducted depending on the nature of the data. The methods of data analysis used to answer the research questions and test hypotheses are as follows:

11.1 Reliability Analysis

Reliability of a scale is to examine its internal consistency by calculating Cronbach's alpha. This method indicates the extent to which items (elements) within a scale are homogenous or correlated (Saraph et al., 1989; Badri et al., 1995). It helps to determine whether the same set of items would elicit the same responses if the same questions are recast to the same respondents. Variables derived from test instruments

are declared to be reliable only when they give reliable responses which are numerical coefficient of reliability

11.2 Descriptive Statistics

A set of brief descriptive coefficients that summarizes a given data set, which can either be a representation of the entire population or a sample. The measures used to describe the data set are measures of central tendency and measures of variability or dispersion. Measures of central tendency include the mean, median and mode, while measures of variability include the standard deviation (or variance), the minimum and maximum variables. Descriptive statistics provide a useful summary of security returns when performing empirical and analytical analysis, as they provide a historical account of return behavior. Although past information is useful in any analysis, one should always consider the expectations of future events.

11.3 The t Test

The t-test is applied when the comparison of means of two samples is to be drawn. When we have only two samples we can use the t-test to compare the means of the samples. The t-test assess whether the means of two samples are statistically different from each other.

11.4 Spearman's rho Correlation

It is often the case that the data we wish to measure the correlation for is not of the interval or ratio level of measurement. The Spearman rho correlation coefficient handles this situation due to the ordinal data.

The formula for calculating the Spearman rho correlation coefficient is as follows.

$$\text{rho(p)}=1-\frac{6\sum d^2}{n(n^2-1)}$$

n is the number of paired ranks and d is the difference between the paired ranks. If there are no tied scores, the Spearman rho correlation coefficient will be even closer to the Pearson product moment correlation coefficient. Also note that this formula can be easily understood when your realize that the sum of the squares from 1 to n can be

expressed as $n(n + 1)(2n + 1)/6$. From this you can realize the least sum of d^2 is zero and the greatest sum of d^2 is twice the sum of the squares of the odd integers up to $n/2$ and this then scales such a sum between -1 and +1.

11.5 Multiple Regressions

Multiple regression analysis is a multivariate statistical technique used to examine the relationship between an outcome variable and several predictors (George and Mallery, 2003). Multiple regression analysis examines the relationships among variables, and the extent to which they are linked and explain the dependent variable (Gay, 1996).

11.6 Levene's Test for Equality of Variances

Levene's test is an inferential statistic used to assess the equality of variances in different samples. Some common statistical procedures assume that variances of the populations from which different samples are drawn are equal. Levene's test assesses this assumption. It tests the null hypothesis that the population variances are equal (called homogeneity of variance). If the resulting p-value of Levene's test is less than some critical value (typically 0.05), the obtained differences in sample variances are unlikely to have occurred based on random sampling. Thus, the null hypothesis of equal variances is rejected and it is concluded that there is a difference between the variances in the population. Procedures which typically assume homogeneity of variance include analysis of variance and t-tests. One advantage of Levene's test is that it does not require normality of the underlying data. Levene's test is often used before a comparison of means. When Levene's test is significant, modified procedures are used that do not assume equality of variance. Levene's test may also test a meaningful question in its own right if a researcher is interested in knowing whether population group variances are different.

12. Summary of Hypothesis Testing

Table 12.1: Summary of Hypothesis Testing

S.No	*Hypotheses*	*F/t value*	*Sig*	*Results*
	KM Dimensions across Management Levels			
$H_0$1: There is no significant difference in KM practices being practiced between high and low responses of strategic levels of SMEs				

	organizational benefits of KM	2.768	0.007	Rejected
	Top priority to KM	3.687	0.003	Rejected
	KM Value system	3.388	0.001	Rejected
	Strategic partnerships	4.245	0.000	Rejected
	KM initiatives	4.176	0.001	Rejected
	Reward systems	6.201	0.000	Rejected
$H_0$2: There is no significant difference in KM practices being practiced between high and low responses of operational levels of SMEs.				
	KM infrastructure Dimensions			
	Culture	6.188	0.000	Rejected
	Employee Participation	7.326	0.000	Rejected
	Leadership	5.170	0.000	Rejected
	Rewarding with incentives	5.681	0.000	Rejected
	Training & mentoring	6.070	0.000	Rejected
	KM Process Dimensions			
	Knowledge Acquisition and capture	7.579	0.000	Rejected
	Knowledge Storage and preservation	7.685	0.000	Rejected
	Knowledge Sharing	7.089	0.000	Rejected
	Impact of KM Infrastructure Dimensions on KM Process			
3	There is no significant impact of culture as a dimension of KM infrastructure on knowledge acquisition and capture.	-0.377	0.707	Not rejected
4	There is no significant impact of employee participation as a dimension of KM infrastructure on knowledge acquisition and capture.	1.291	0.202	Not rejected
5	There is no significant impact of leadership as a dimension of KM infrastructure on knowledge acquisition and capture.	0.831	0.409	Not rejected
6	There is no significant impact of rewarding with incentives as a dimension of KM infrastructure on knowledge acquisition and capture	0.476	0.636	Not rejected
7	There is no significant impact of training and mentoring as a dimension of KM infrastructure on knowledge acquisition and capture	1.700	0.04	Rejected
8	There is no significant impact of culture as a dimension of KM infrastructure on knowledge storage and preservation.	0.039	0.969	Not rejected
9	There is no significant impact of employee participation as a dimension of KM infrastructure on knowledge storage and preservation.	2.159	0.035	Rejected
10	There is no significant impact of leadership as a dimension of KM infrastructure on knowledge storage and preservation.	1.504	0.138	Not rejected
11	There is no significant impact of rewarding with incentives as a dimension of KM infrastructure on knowledge storage and preservation.	-0.036	0.972	Not rejected
12	There is no significant impact of training and mentoring as a dimension of KM infrastructure on knowledge storage and preservation.	0.936	0.353	Not rejected
13	There is no significant impact of culture as a dimension of KM infrastructure on knowledge sharing.	0.114	0.91	Not rejected

14	There is no significant impact of employee participation as a dimension of KM infrastructure on knowledge sharing.	2.008	0.049	Rejected
15	There is no significant impact of leadership as a dimension of KM infrastructure on knowledge sharing.	2.348	0.022	Rejected
16	There is no significant impact of rewarding with incentives as a dimension of KM infrastructure on knowledge sharing.	0.825	0.413	Not rejected
17	There is no significant impact of training and mentoring as a dimension of KM infrastructure on knowledge sharing.	0.404	0.687	Not rejected
	Impact of KM Strategy Dimensions on KM Process			
18	There is no significant impact of KM policy as a dimension of KM Strategy on knowledge acquisition and capture.	1.642	0.106	Not rejected
19	There is no significant impact of KM plan as a dimension of KM Strategy on knowledge acquisition and capture.	0.833	0.408	Not rejected
20	There is no significant impact of KM budget allocation as a dimension of KM Strategy on knowledge acquisition and capture.	-0.003	0.998	Not rejected
21	There is no significant impact of ICT investment as a dimension of KM Strategy on knowledge acquisition and capture.	0.779	0.439	Not rejected
22	There is no significant impact of KM policy as a dimension of KM Strategy on knowledge storing and preservation.	1.642	0.106	Not rejected
23	There is no significant impact of KM plan as a dimension of KM Strategy on knowledge storing and preservation.	0.833	0.408	Not rejected
24	There is no significant impact of KM budget allocation as a dimension of KM Strategy on knowledge storing and preservation.	-0.003	0.439	Not rejected
25	There is no significant impact of ICT investment as a dimension of KM Strategy on knowledge storing and preservation.	0.780	0.440	Not rejected
26	There is no significant impact of KM policy as a dimension of KM Strategy on knowledge sharing.	1.645	0.105	Not rejected
27	There is no significant impact of KM plan as a dimension of KM Strategy on knowledge sharing.	0.826	0.412	Not rejected
28	There is no significant impact of KM budget allocation as a dimension of KM Strategy on knowledge Sharing.	0.099	0.921	Not rejected
29	There is no significant impact of ICT investment as a dimension of KM Strategy on knowledge sharing.	-0.165	0.870	Not rejected
	Impact of ICT Infrastructure Dimensions on KM Process			
30	There is no significant impact of ICT facility as a dimension of ICT infrastructure on knowledge acquisition and capture.	1.520	0.050	Rejected
31	There is no significant impact of ICT usage as a dimension of ICT infrastructure on knowledge acquisition and capture.	3.221	0.002	Rejected
32	There is no significant impact of ICT facility as a dimension of ICT infrastructure on knowledge storage and preservation	2.137	0.036	Rejected
33	There is no significant impact of ICT usage a dimension of ICT infrastructure on knowledge storage and preservation	2.036	0.046	Rejected
34	There is no significant impact of ICT facility as a dimension of ICT infrastructure on knowledge sharing	1.179	0.243	Not Rejected
35	There is no significant impact of ICT usage as a dimension of ICT infrastructure on knowledge sharing	4.108	0.000	Rejected

Comparison of SMEs with Large on KM Infrastructure Dimensions				
36	There is no significant difference on culture as a dimension of KM infrastructure among SMEs and large organizations.	-3.002	0.004	Rejected
37	There is no significant difference on employee participation as a dimension of KM infrastructure among SMEs and large organizations.	-2.444	0.017	Rejected
38	There is no significant difference on leadership as a dimension of KM infrastructure among SMEs and large organizations.	-2.766	0.007	Rejected
39	There is no significant difference on rewarding with incentives as a dimension of KM infrastructure among SMEs and large organizations	0.196	0.845	Not Rejected
40	There is no significant difference on training and mentoring as a dimension of KM infrastructure among SMEs and large organizations.	-2.25	0.027	Rejected
Comparison of SMEs with Large on KM Strategy Dimensions				
41	There is no significant difference of KM policy as a dimension of KM strategy among SMEs and large organizations.	-7.127	0.000	Rejected
42	There is no significant difference of KM plan as a dimension of KM strategy among SMEs and large organizations.	-2.417	0.018	Rejected
43	There is no significant difference of KM budget allocation as a dimension of KM strategy among SMEs and large organizations.	-2.504	0,014	Rejected
44	There is no significant difference of ICT investment as a dimension of KM strategy among SMEs and large organizations.	-2.774	0.007	Rejected
Comparison of SMEs with Large on KM Process Dimensions				
45	There is a no significant difference of knowledge acquisition and capture of KM Process among SMEs and large organizations.	-4.669	0.000	Rejected
46	There is no significant difference of knowledge storage and preservation as a dimension of KM process among SMEs and large organizations.	-4.516	0.000	Rejected
47	There is no significant difference of knowledge sharing as a dimension of KM process among SMEs and large organizations.	-2.195	0.031	Rejected
Comparison of SMEs with Large on ICT Infrastructure Dimensions				
48	There is no significant difference of ICT facility as a dimension of ICT infrastructure among SMEs and large organizations.	-4.695	0.000	Rejected
49	There is no significant difference of ICT usage as a dimension of ICT infrastructure among SMEs and large organizations.	-8.730	0.000	Rejected

Hypothesis testing helped to understand relative difference of KM Practices in the different levels of management. It has also given a clear understanding of impact of the various KM dimensions such as KM strategy, KM infrastructure, and ICT infrastructure to KM process in SMEs. A comparison of SMEs with large auto component firms has also depicted some of the relevant points which are listed below:

Among the Strategic level,

- There is significant difference in KM practices being practiced between high

and low responses of strategic levels of SMEs pertaining to KM variables such as organizational benefits of KM, top priority to KM, value system of KM, Strategic partnerships used by SMEs, KM initiatives, and rewarding system that are planned at Strategic level.

Among the Operational level,

- There is significant difference in KM practices being practiced between high and low responses of operational levels of SMEs. KM infrastructure dimensions like culture, employee participation, leadership, rewarding with incentives, training and mentoring practices implemented at this level of management are having significance. KM process dimensions such as Knowledge acquisition and capture, knowledge storing and preservation and knowledge sharing are showing a significant difference in the process of KM being followed at this level.
- There is a significant impact of training and mentoring on knowledge acquisition and capture. Rest of the KM infrastructure dimensions like culture, employee participation, leadership and rewarding with incentives are not having significant impact on Knowledge acquisition and capture.
- There is a significant impact of employee participation on knowledge storage and preservation. Rest of the KM infrastructure dimensions like culture, leadership and rewarding with incentives and training and mentoring systems are not having significant impact on knowledge storage and preservation process.
- There is a significant impact of employee participation and leadership on knowledge sharing. Rest of the KM infrastructure dimensions like culture, rewarding with incentives and training and mentoring systems are not having impact on knowledge sharing process.
- There is no significant impact of KM strategy such as KM policy, KM Plan, KM budget allocation and ICT investment on any of the KM process components – Knowledge acquisition and capture, Knowledge storing and preservation and Knowledge sharing process at SMEs.
- There is a significant impact of ICT facility and ICT usage on Knowledge acquisition and capture and Knowledge storing and preservation process of KM.

- There is a significant impact of ICT usage on knowledge sharing process.
- ICT facility is not having impact on knowledge sharing.

In comparison of SMEs and large auto component firms,

- There is a significant difference of culture, employee participation, leadership and training and mentoring practices adopted.
- There is no difference in rewarding schemes adopted among large and SMEs.
- There is a difference in KM strategies that are followed in SMEs and large. KM policy, KM plan KM budget allocation and ICT investment are the KM strategies which are different in comparison among these auto component firms.
- A KM process which includes knowledge acquisition and capture, knowledge storing and preservation and knowledge sharing adopted is different among SMEs and large firms.
- ICT facility and its usage show a significant difference among SMEs and large organizations.

13 Key Findings

The following are the key findings that were inferred from this research study with respect to the auto component firms:

Findings - KM infrastructure at Strategic Level of SMEs

Table 13.1: Findings - Strategic Level of SMEs

S.No	Findings of this research	Correlation with previous study	Explanation
1	At the strategic level, KM benefits are understandable to executives. Executives agree and feel that KM has to be accorded top priority. Top executives in SMEs desire to promote knowledge sharing as a value system. Executives believe that strategic partnerships facilitate knowledge acquisition and they are committed for KM initiatives.	*Wong and Aspinwall (2005).* *(Martensson, 2000; Manasco, 1996; Truch, 2001; Jarrar, 2002; Sharp, 2003; Davenport et al., 1998).*	Top Management support is one among the eleven critical success factors for implementing KM in SME. Wong and Aspinwall (2005). Support and commitment from senior management is critical to a KM initiative (Martensson, 2000; Manasco, 1996; Truch, 2001; Jarrar, 2002; Sharp, 2003; Davenport et al., 1998).

Findings - KM infrastructure at Operational Level of SMEs

Table 13.2: Findings - KM infrastructure at Operational Level of SMEs

S.No	Findings of this research	Correlation with previous study	Explanation
2	KM infrastructure dimensions such as culture, employee participation, leadership, rewarding with incentives and training and mentoring are significantly different among the high and low responses of operational levels in SMEs.	*Wong and Elaine Aspinwall (2005).*	They have identified eleven (11) critical success factors for KM adoption in SME sector. This survey was done in all sectors of SMEs of UK. The critical success factors were ranked as follows: **leadership** and support, **culture**, strategy and purpose, resources, processes and activities, **training and education**, human resource management, information technology, **motivational aids**, organizational infrastructure and measurement.

Findings - KM Process at operational level of SMEs

Table 13.3: Findings - KM Process at Operational Level of SMEs

S.No	Findings of this research	Correlation with previous study	Explanation
3	KM Process such as knowledge acquisition and capture, knowledge storage and preservation and knowledge sharing are having significant differences among the high and low response rates of operational level in SMEs.	***Gold, Malhotra, and Segars (2001) - effectiveness model.***	He defined the Knowledge process capability as the integration of knowledge processes into the organization, and is operational by acquisition, (the capturing of knowledge), conversion (making captured knowledge available), application (degree to which knowledge is useful), & protection (security of the knowledge). This model proved that process capabilities and the performance variable were positive and of high magnitude.

Findings - Impact of KM infrastructure dimensions on KM Process

Table 13.4: Findings - Impact of KM infrastructure dimensions on KM Process

S.No	Findings of this research	Correlation with previous study	Explanation
4	**Knowledge Acquisition and Capture Process** Culture, Employee participation, Leadership and rewarding with incentives have no impact but Training and mentoring has more impact on Knowledge acquisition and capture.	***The findings are partly consistent with Lee and Choi (2003) and*** ***(Gold, Malhotra, and Segars, 2001).*** ***Rests of the dimensions are not correlating with previous study.***	Lee and Choi (2003) indicated that the organizational culture variable is essential for knowledge creation. The study focused only on relatively large and profitable firms, and hence insisted that the results may differ in small firms. The ability to acquire knowledge is, however, partly based on an organization's absorptive

			capacity (Gold, Malhotra, and Segars, 2001).
5	**Knowledge Storage and Preservation Process** Employee participation has more impact on knowledge storage and preservation. Culture, leadership, Rewarding with incentives and training and mentoring for employees has low impact on knowledge storage and preservation.	***Delong and Fahey (2000)*** ***Rests of the dimensions are not correlating with previous study.***	Collaboration and social interaction are the factors which is indicative of employee participation in an organization. Delong and Fahey (2000) cited interactivity, collaboration, sharing and teaching, shaping social interaction in the context of knowledge management.
6	**Knowledge Sharing Process** Leadership role and employee participation initiatives by the employees have a larger impact on knowledge sharing and Culture, rewarding with incentives, and training and mentoring has no impact on knowledge sharing.	***Oliver and Kandadi, (2006).*** ***Smith and Rupp (2002)*** ***Al-Alawi et al. (2007) Rests of the dimensions are not correlating with previous study.***	Leadership has positive impact on knowledge sharing. Oliver and Kandadi, (2006). Smith and Rupp (2002) also revealed that interaction between co-workers is fundamental in encouraging knowledge sharing. Similarly, Al-Alawi et al. (2007) found that communication among staff is positively related to knowledge sharing in organizations.

Findings - Impact of KM Strategy dimensions on KM Process

Table 13.5: Findings - Impact of KM Strategy dimensions on KM Process

S.No	Findings of this research	Correlation with previous study	Explanation
7	There is no impact of KM strategy such as KM policy, KM plan, KM budget allocation and ICT investment on the KM process dimensions such as Knowledge acquisition and capture, Knowledge storing and preservation and knowledge sharing.	***No correlation with the previous studies.***	One of the means for driving the success of KM is to have a clear and well-planned strategy (Liebowitz, 1999). Keskin (2005) conducted an empirical study on the relationship between knowledge management strategy and firm performance. His studies prove KM strategies have positive effects on firm performance. Since the findings do not correlate with the studies, it proves that SMEs have poor strategy for KM. SMEs are not having a unique and systematic way of implementing knowledge management process.

Findings - Impact of ICT infrastructure dimensions on KM Process

Table 13.6: Findings - Impact of ICT infrastructure dimensions on KM Process

S.No	Findings of this research	Correlation with previous study	Explanation
8	ICT infrastructure facility and its usage has an impact on knowledge acquisition process and knowledge storage and preservation process but not on knowledge sharing	***Mohamed Khalifa and Vanessa Liu (2003)*** ***Wong (2005)*** ***Park (2006)***	According to Wong (2005), information technology is a critical success factor of SMEs. Mohamed Khalifa and Vanessa Liu (2003) tested the role of information technology (IT) in relation to other important KM infrastructural capabilities and to KM process capabilities. The results were positive. Park (2006) conducted an empirical study examining the link among KM enablers (infrastructure capability), KM process capability, and knowledge management performance. Findings of this study include technology was a significant positive explanatory variable of knowledge acquisition, knowledge conversion, and protection.

Findings - Comparison of SMEs with Large on KM Infrastructure Dimensions

Table 13.7: Comparison on KM Infrastructure dimensions

S.No	Findings of this research	Correlation with previous study	Explanation
9	**Culture** In comparison of Large and SME auto component firms, a difference in culture is noted.	*Ghobadian and Gallear (1997) and* *Yusof and Aspinwall (2000)*	Culture at SMEs are more fluidic and organic rather than large organizations by Ghobadian and Gallear (1997). According to Yusof and Aspinwall (2000), A owner-manager who is both dictatorial and not committed can be problematic when implementing new initiatives. The owner has less trust on his employees or does not encourage the culture of sharing and transferring knowledge. Hence cultural difference is noted in SME and Large organizations.
10	**Employee participation** In comparison of Large and SME auto component firms, there is a difference in participation of employees.	*Axland (1992)* *Kuan Yew Wong and Elaine Aspinwall (2004)*	Collaboration is easy in SMEs due to few employees and better for KM change initiatives but SMEs have low degree of specialization and formalization which resist KM. This shows employee participation differs among SME and large firms.
11	**Leadership** Leadership initiatives for KM are different among Large and SMEs.	*Holsapple and Joshi, 2000*	Leaders establish the necessary conditions for effective KM (Holsapple and Joshi, 2000) which is obviously seen in large firms rather than less in SMEs. In SMEs, it becomes difficult for the owner to recognize the need for change. Since the owners are the leaders, it is up to them to either promote or hamper the KM process due to authoritative style of leadership.

12	**Rewarding with incentives** Rewarding with incentives are not significant among large and SMEs	***Not consistent with the previous studies.***	(Al-Alawi et al.,2007; Syed–Ikhsan and Rowland, 2004; Davenport and Prusak, 2000; Gupta and Govindarajan, 2000) argue that rewarding system is important for KM. Results of this study show that rewarding system is not promoting KM in auto component SMEs and large organizations.
13	**Training and Mentoring** Training and Mentoring are different among Large and SMEs.	***Matlay(2000a, 1997)*** ***Rajesh K. Pilliania 2008***	Most of the SMEs rely more on informal learning programs due to their lack of resources. As Matlay(2000a, 1997) stated, learning in this type of firm is mostly incidental and reactive rather big firms. The requirements and resources of SMEs are different from big firms as by Rajesh K. Pilliania (2008). SME does not have a systematic planning for training activities. It happens as and when there is a need for it and training is not in consistent and continuous way. Barber et al (1989) mentioned that levels of training tend to grow as firms grow and that smaller firms tend to perform training informally. In SME, there is no full time mentor to groom the employees. SMEs invest less in employee training as they do not have much funds and budgets to spend on such activity compared to large.

Findings - Comparison of SMEs with Large on KM Strategy Dimensions

Table 13.8: Comparison of SMs with Large on KM Strategy dimensions

S.No	Findings of this research	Correlation with previous study	Explanation
14	There is a difference in KM policy, KM plan, budget allocation and ICT investment Strategy of Large and SME organizations	*Rajesh K. Pilliana (2008).*	According to Rajesh K. Pilliana (2008), a well-developed and aligned KM strategy is the key strategic issue of KM. The studies on KM strategy mainly focused on big firms but the requirements and resources of SMEs are different from big firms. Consequently, KM practices are different in SMEs as compared to big firms.

Findings - Comparison of SMEs with Large on KM Process Dimensions

Table 13.9: Comparison of SMs with Large on KM Process dimensions

S.No	Findings of this research	Correlation with previous study	Explanation
15	**Knowledge acquisition and capture** There is a difference in Knowledge acquisition and capture among SME and large firms	*Mc Adam & Reid (2001)*	Construction of new knowledge in SMEs is less advanced but can be easy and simple than in large organizations according to Mc Adam & Reid (2001).
16	**Knowledge storage and preservation** There is a difference in Knowledge storage & preservation among SME and large firms	*Desouza and Awazu (2006)*	In SMEs there is lack of explicit knowledge repositories. Instead, each manager/owner acts as the knowledge repository. More verbal communication happens hence due to lack of resources they do not focus much on storing and preservation of knowledge which does not happen in large firms. SMEs do not manage knowledge in similar fashions as larger organizations.

17	**Knowledge sharing** There is a difference in Knowledge sharing among SME and large firms	*Desouza and Awazu (2006)* *Jonathan Staplehurst (2010)*	Desouza and Awazu (2006), SMEs share tacit knowledge rather explicit by large organizations. Due to lack of knowledge sharing systems, knowledge is related to an organization's core competencies and held as tacit knowledge in the minds of key employees; so SMEs are very sensitive to the loss of employees (Lim & Klobas 2000) Job roles and facilities are entirely different for SMEs and large that makes a difference in knowledge sharing. (Jonathan Staplehurst 2010).

Findings - Comparison of SMEs with Large on ICT Infrastructure Dimensions

Table 13.10: Comparison of SMs with Large on ICT infrastructure dimensions

18	ICT Infrastructure There is a difference in ICT facility and usage among SME and large firms.	*Desouza and Awazu (2006)*	Lees and Lees (1987) stated that small firms do not undertake adequate planning for their use and operation of IT. Bergeron and Raymond (1992) argued that IT can be used as a strategic weapon by small firms to maintain their competitiveness and attain a favorable position. Small firms depend on external IT expertise in the form of consultants and vendors (Thong *et al.* 1994). SMEs knowingly or unknowingly, manage knowledge in the humanistic way. The use of technology in an SME is mostly limited to acts of automation. Knowledge is created, shared, transferred, and applied via people based mechanisms rather technology plays a vital role in managing knowledge in large firms due to good facility and resources.

14 Recommendations

- ***KM Strategy:*** A KM strategy could lead to a systematic implementation of KM process at the operational level of management in order to yield a better performance. (Liebowitz, 1999; O'Dell et al., 1999; Soliman and Spooner, 2000). Auto component SMEs should understand the importance and benefits of framing KM strategies and should put a KM strategy in right place.
- ***Change Initiative:*** SMEs consist of a small number of employees. As such it is easier to get the employees at one place at one time, easier to have one pattern of behavior and thought process, and therefore easier to initiate any change. Therefore any change especially in KM can be easier to bring about and weave into the cultural fabric of the organization. (Ghobadian and Gallear, 1997)
- ***Training and Development Opportunities:*** The employee should be developed by providing systematic and continuous planning for training opportunities. This in the long run would improve and enhance the personal value of individuals and also help them in creating explicit knowledge repository and develop a nature of better knowledge sharing. This would also equip them with the skills to foster creativity, innovation, and knowledge sharing. (Yahya and Goh, 2002)
- ***Owner-Leader:*** The owner of the SME is the leader and therefore the owner is in a strong position to control the behavior of all employees. Success of KM depends on the owner / manager personal interest and therefore he should initiate at his end to promote a KM culture which is most lacking in SMEs.
- ***Authoritative style of leadership:*** High focus is given to core operational activities in SMEs and no time to think about the strategic issues. Since the owners are the leaders, it is up to them to either promote or hamper the KM process due to authoritative style of leadership. (Yusof and Aspinwall, 2000). Owners should understand and prioritize KM in SMEs.
- ***Resources:*** SMEs face scarcity of resources. (Welsh and White, 1981; Lee and Oakes, 1995; Motwani et al., 1998; OECD, 2002; Jun and Cai,2003). Hence SMEs should identify the resources that better suits the KM initiatives

and needs. They could implement KM by obtaining the necessary and better resources.

- ***Incentives:*** The provision of both monetary and nonmonetary benefits are on paper but is not incorporated in reality into a reward system that motivate and support KM. SMEs should look into this issue to identify which rewarding scheme would motivate employees to contribute for KM process. (Hurley and Green, 2005)
- ***Formal Method for Knowledge Acquisition:*** SMEs should lay down a formal structure and a framework for knowledge acquisition. Knowledge acquisition could be done by hiring knowledgeable individuals / Chief Knowledge officer (CKO) to manage the KM process as other methods of acquiring knowledge can be very expensive (as most SMEs are not financially very strong).
- ***Formal method for Knowledge transfer:*** SMEs adopt an informal method for adopting Knowledge transfer. (Alavi and Leidner 2001). SMEs should follow a better method of systematic knowledge transfer.
- ***Knowledge Updation:*** In order to be more competitive, they could hire knowledge assets and involve in research activities to keep their employees up to date.
- ***Knowledge Repository:*** Owner/Manager himself is a knowledge repository. (Desouza and Awazu 2006). SMEs should create explicit knowledge repository and awareness should be created about its usage and maintenance.
- ***Formal method of storing knowledge*:** Formal method of storing knowledge should be devised in SMEs as currently the communication culture is verbal and informal. There should be provision to facilitate storage in a readily retrievable format for future use.
- ***Flat Structure*:** Knowledge sharing is enabled in SMEs because of an inherently flat structure wherein organizational levels are virtually non-existent. Further most employees are in constant and in close contact with each other. Also face to face meetings take place frequently or on a daily basis. SMEs should however evolve a better formal method of transfer or sharing of knowledge.

- ***KM process:*** Managers in SMEs lack formal management skills (Rothwell and Dodgson, 1994). Hence SMEs should practice KM in a systematic, formal, consistent and in a continual way.
- ***ICT facility:*** Lees and Lees (1987) state that small firms do not undertake adequate planning for their use and operation of IT. ICT nowadays in unavoidable. (Lee and Choi, 2003). SMEs should concentrate on implementing up-to date ICT infrastructure facility to promote KM. Better collaborative tools; net meeting facilities, conferencing and groupware systems can be implanted for knowledge sharing.
- ***ICT investment:*** SMEs do not fully exploit the potential benefits of IT for KM (Egbu and Botterill 2002). SMEs should understand the importance of investing in ICT in such a way that there can be a better use of ICT to facilitate KM practices.
- ***Communication method:*** In SMEs, the communication culture is verbal, informal and "in the corridor' type (Dalley & Hamilton, 2000). Knowledge in SMEs is passed on without any associated records or documents because of more informal communication, less formal work systems & procedures hence should have the facility of formal system of codifying, storing and preserving knowledge.

15 Implications for the study

This research study helps employees of the SMEs to define their knowledge management strategies and knowledge management infrastructure dimensions more clearly, to understand knowledge management process in auto component organizations in greater depth, and to lead them for more effectively managing knowledge.

Some of the practical implications for the industry include:

1. To enhance knowledge management process in SMEs, employees could place greater emphasis on improving the KM dimensions: strategy, culture, employee participation, leadership role, and information and communication technology.
2. By linking use of KM with the incentive system (both monetary and non monetary), the SMEs can be encouraged to follow KM.

3. The KM strategy should be aligned with business strategy for implementation to follow at the operational level.
4. It is important for employees to understand that it is not enough to influence knowledge management process by merely making knowledge acquisition, upgrade, store and protection. Managers should develop a policy, guidelines and procedure to follow it in the organization.
5. Information and Communication Technology (ICT) provides an excellent medium for acquiring, storing, protecting and sharing and application of knowledge. Even then if employees pay too much attention to these technologies but ignore KM infrastructure dimension, then knowledge management process may decline.
6. In comparison of SMEs with large auto component firms, SMEs lack in infrastructure, facility and resources. However, they do practice KM in an informal way. SMEs have to understand the importance of KM and follow a standardized KM framework for a better KM process which in turn yields better performance of the organization.
7. SMEs should focus on their strengths and make best use of them in initiating KM. The strengths are:
    - *A unified culture:* This can provide SMEs with a strong foundation for change such as implementing KM.
    - *Few Employees:* As SMEs consist of a small number of employees, is easier to get all employees together to initiate and implement a change. Employees know each other more intimately and have face-to-face interaction with them. Collaboration among employees makes them easy to initiate any change especially KM.
    - *Flat structure:* Knowledge sharing is easy in SMEs due to flat structure. The employees are in close contact and become easy to spread the knowledge among less number of employees in SMEs.
    - *Low bureaucracy:* As number of levels is non-existent in SMEs and owner and manager in most cases are the same hence change can be initiated fast.

16 Scope for Future Research

The current research reveals an important substantiation to the theoretical findings identified in advance in literature with respect to the crucial factors that are important in ensuring the successful adoption of KM among SMEs of Pune region. This will further help to increase the competencies of SMEs in managing knowledge and increasing organizational performance. This study suggests the following research recommendations where additional investigation may be fruitful.

- Also further research could include the relationship of KM infrastructure variables, KM strategy and KM process with performance and competitiveness of the SMEs.
- Keeping in mind the strengths of SMEs such as small number of employees, flatter structure, and low level of bureaucracy, the scope of initiating immediate change, implementing KM initiative can be explored.
- Future research may try to access a single organization as a case based study to examine in detail the areas mentioned. Research also can determine whether the variables and their relationship are consistent over time in a longitudinal case study.
- The study should be replicated in different industries as this would strengthen and validate the findings of the hypotheses so as to substantially increase the number of respondents as well as to maintain concise accuracy in terms of results.
- The current study was conducted only in the auto component industries and future cross-cultural research would be valuable. Future studies should be directed towards examining the behavior from different ethnic backgrounds.
- Future studies may add variables, such as structure, attitude, people, top management support, trust into the knowledge management model and make the model more comprehensive.
- Future studies may add socio-demographic characteristics of participants. This information can be used to explore other intervening variables such as gender, age, ethnicity, experience, etc.
- Future research may cover financial performance data such as ROI (Return on Investment), net revenue, or other financial indicators that can be connected with knowledge management process.

A STUDY OF KNOWLEDGE MANAGEMENT PRACTICES IN SMALL & MEDIUM SIZED ENTERPRISES OF PUNE DISTRICT

THESIS

SUBMITTED FOR THE AWARD OF THE DEGREE OF

Ph. D. (Business Administration)

BY

M. LAVANYA

Under the Supervision of

Dr. (Mrs.) Salma Ahmed
Associate Professor
Department of Business Administration
Faculty of Mgt. Studies and Research
Aligarh Muslim University, Aligarh
(Internal Advisor)

Dr. M. Venkatesan
Associate Professor,
Indian Institute of Foreign Trade
New Delhi
(External Advisor)

DEPARTMENT OF BUSINESS ADMINISTRATION
FACULTY OF MANAGEMENT STUDIES AND RESEARCH
ALIGARH MUSLIM UNIVERSITY
ALIGARH, INDIA

2012

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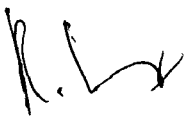
DECLARATION

I hereby declare that the thesis titled **"A STUDY OF KNOWLEDGE MANAGEMENT PRACTICES IN SMALL & MEDIUM SIZED ENTERPRISES OF PUNE DISTRICT"** has been submitted to the Department of Business Administration, Faculty of Management Studies And Research, Aligarh Muslim University, Aligarh, India for the award of the degree of Ph.D. in Business Administration is a record of original work done by me under the supervision and guidance of Dr.(Mrs.) Salma Ahmed, Reader, Department of Business Administration, Aligarh Muslim University, Aligarh (Internal Guide) and Dr. M. Venkatesan, Associate Professor, Indian Institute of Foreign Trade(IIFT), New Delhi (External Guide) and has not previously formed the basis for the award of any Degree / Diploma / Associateship / Fellowship or any similar title to any candidate of any University.

Place-Pune

Date-



(M. Lavanya)

Dr. (Mrs.) Salma Ahmed
Associate Professor

Department of Business Administration
Aligarh Muslim University, Aligarh
Phone: 2700920 (Exchange), EXT: 3580 (O)

May 22, 2012

CERTIFICATE

This is to certify that the thesis titled **"A STUDY OF KNOWLEDGE MANAGEMENT PRACTICES IN SMALL & MEDIUM SIZED ENTERPRISES OF PUNE DISTRICT"** submitted to the Department of Business Administration. Faculty of Management Studies and Research, Aligarh Muslim University, Aligarh. India for the award of the degree of Ph.D (Business Administration) is a record of original work done by **M. Lavanya** during the period of her study in the Department of Business Administration, Faculty of Management Studies and Research, Aligarh Muslim University, Aligarh. India under my supervision and guidance as Internal Advisor. To the best of my knowledge and belief the thesis is not previously formed the basis for the award of any Degree / diploma / Associate ship / Fellowship or similar or any other similar title to any candidate of this University or anywhere else.

Salma Ahmed.

Dr. (Mrs). Salma Ahmed
Internal Advisor

Place : Aligarh
Date :

भारतीय विदेश व्यापार संस्थान
मानित विश्वविद्यालय
INDIAN INSTITUTE OF FOREIGN TRADE
(DEEMED UNIVERSITY
(AN AUTONOMOUS INSTITUTION OF MINISTRY OF COMMERCE & INDUSTRY

बी-21, कुतुब इंस्टीट्यूशनल एरिया, नई दिल्ली-110016
B-21, Qutab Instituional Area, New Delhi-110016
Phone : 26965124, 26531507, 26531565
Fax : 0091-11-26853956, Website : www.iift.edu

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This is to certify that the thesis titled " **A Study of Knowledge Management Practices in Small & Medium Sized Enterprises of Pune District** " submitted to the Department of Business Administration, Faculty of Management Studies & Research, Aligarh Muslim University, Aligarh, India for the award of the degree of Doctorate of Philosophy in Business Administration is a record of original work done by **Mrs. M. Lavanya** during the period of her study in the Department of Business Administration, Faculty of Management Studies & Research, Department of Business Administration, Aligarh Muslim University, Aligarh, India under my supervision and guidance as External Guide. To the best of my knowledge and belief the thesis is not previously formed the basis for the award of any Degree / diploma / Associate ship / Fellowship or similar or any other similar title to any candidate of this University or anywhere else.

Dr.M.Venkatesan (External Guide)
Associate Professor
IIFT, NEW DELHI

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PREFACE

One of the most significant evolutions in the business environment over the past decade is the dawn of the new economy. The velocity and dynamic nature of markets has created a competitive incentive among many companies to leverage their knowledge assets as a means of creating value and achieving a competitive edge. Knowledge is increasing recognized as a key business imperative and has positive impacts for organizations in terms of efficiencies, effectiveness and competitiveness (Alavi and Leidner 2001, Grover and Davenport 2001). While there are many reasons for pursuing knowledge management (KM), many organizations contend that KM can lead to significant improvements in current operational performance, future capacity and adaptability to changing customers' needs and market conditions (Beckman 1997, Cross and Baird 2000, Earl 2001). The focus on Knowledge Management (KM) is a critical area also for small and medium sized enterprises (SMEs). In particular, the management of knowledge assets may provide small firms new tools for survival, growth and maintaining a sustainable competitive advantage (Omerzel and Antoncic, 2008).

There is a general consensus in business practices and academia on the fact that SMEs are falling behind large companies in developing KM practices and benefits of KM has not fully exploited by these firms. This is reflected in a literature gap where little research efforts have been carried out on this topic. Indeed, to date, there is an abundance of literature describing how various large companies are successfully practicing KM, but the reasons why small firms show poor usage of KM are still unclear and little contributions on the critical success factors for KM adoption in SMEs in Indian context.. Indeed, empirical studies have been rarely conducted on this topic. In addition, there is a growing need for qualitative analysis of the effects of knowledge management practices of SMEs especially in Indian context.

In today's knowledge era, not only it is a need for larger organizations but it is a need also for Small and Medium Enterprises to practice knowledge management process. The knowledge that is available within the organization are to be managed to improve organization efficiency. Such an environment and culture will deliberately and systematically help to share information and knowledge with each other which will reduce error, save valuable planning time, and better individual and organizational

performance. Knowledge acquisition, knowledge storage, knowledge sharing and its application in problem solving and decision making processes not only help to deal with environmental issues but also encourages new innovations to be created, shared, learned, enhanced, organized and utilized for the benefit of the organization to increase competency in the organization. Knowledge Management (KM) is a critical area for small business managers in today's competitive environment. However, there is a general consensus in relation to the fact that the benefits of KM have not been fully exploited by small firms.

The research deals to study the everyday knowledge management practices being carried out in auto component manufacturing Small and Medium Size Enterprises of Pune region among the strategic and operational levels. A study has been carried out on a sample to test the reliability and validity factors. The questionnaires were administered individually which used five point Likert scale to both the levels and collected data were scored, coded and analyzed on the dimensions of the scale. The data were analyzed using the statistical technique using SPSS 17.0 software which includes analysis of variance (ANOVA), t test, spearman's correlation, Levene's test of varainaces and Regression analysis.

This research thesis is organized into the following chapters including Introduction, Literature review, Research Methodology, Data Analysis, Findings, Recommendations, Implications and Scope for future study. A brief explanation on each of these chapters of this research work is presented here. The readers can view these chapters as an outlook of this entire research work in brief and understand better to go through about each chapter.

Chapter 1: Introduction.

This chapter discusses the introductory concept and background of this research. It focuses on the about the definition of knowledge and knowledge management. It provides the theoretical concepts knowledge and types of knowledge and common terms of KM field. It enumerates the definition, administrative framework and characteristics of Small and Medium Enterprises of India, importance of SME and auto component manufacturing firms. It focuses on the overview of the importance of Knowledge Management in Small and Medium Enterprises with relevance to Indian

auto component manufacturing enterprises. It ends up with the purpose of the research study.

Chapter 2: Literature review.

This chapter focuses on the Knowledge Management literature review in different areas which includes Knowledge Management perceptions, KM Strategy, Knowledge Management capabilities with respect to competitive advantage, IT, Asian countries, learning organizations, and culture. It also addresses studies pertaining to KM in SMEs, Industry clusters, Automotive Industries – International and Indian Context. The review of literature helped to identify the Research gap which is also discussed in this chapter.

Chapter 3: Research Methodology.

This chapter discusses the problem statement, scope of study, research objectives, development of conceptual model, formulation of research hypotheses, research design, questionnaire development and its administration which includes target respondents, sampling technique, pilot study incorporated and the data collection methods. Further, it briefly describes the tools of analysis used in this research study. Finally, the limitations of the study are discussed.

Chapter 4: Data Analysis

This presents the statistical analysis results of the study which has been done on various KM variables such as knowledge management strategy, knowledge management infrastructure, Information and Communication Technology Infrastructure and knowledge management process in auto component manufacturing SMEs and a comparative study with large organizations of Pune region. The discussions include on the study of data analyses to answer the research questions and hypotheses testing.

Chapter 5: Findings, Recommendations, Implications and Scope of the future research

This sums up the main findings from the discussion. The recommendations, implications and scope of future research are discussed.

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List of Abbreviations

The following table describes the significance of various abbreviations and acronyms used throughout the thesis.

Abbreviation	Meaning	Page
KM	Knowledge Management	1
SME	Small and Medium Enterprises	1
ICT	Information and Communications Technology	5
MSME	Ministry of Micro, Small and Medium Enterprises	18
MSMED	Micro, Small and Medium Enterprises Development	18
GDP	Gross Domestic Product	19
OEM	Original Equipment Manufacturers	23
NCR	National Capital Region	23
ACMA	Automotive Component Manufacturers Association of India	24
ITI	Industrial Training Institute	24
MIDC	Maharashtra Industrial Development Corporation	26
PCMC	Pimpri-Chinchwad Municipal Corporation	27
PMC	Pune Municipal Corporation	27
CoPs	Communities of Practice	31
CAGR	Compound Annual Growth Rate	46
NASSCOM	The National Association of Software and Services Companies	46
NAFTA	North American Free Trade Agreement	51
EIM	Electronic Information Management system	54
KBD	Knowledge-based development	57
APO	Asia Productivity Organization	57
KMPI	Knowledge Management Performance Index	58
KPI	Key Performance Indicator	58
CSF	Critical Success Factor	66
SMTE	Small and Medium sized Tourism Enterprises	67
KMS	Knowledge Management System	68
MCCIA	Maharatta Chambers of Commerce Industries and Agriculture	87
ANOVA	Analysis of Variance	109
OECD	Organization for Economic Co-operation and Development	176
CKO	Chief Knowledge officer	176

Chapter 1

INTRODUCTION

Chapter 1
INTRODUCTON

1.1 Introduction

This chapter discusses the introductory concept and background of this research. It focuses on the about the definition of knowledge and knowledge management (KM). It provides the theoretical concepts knowledge and types of knowledge and common terms of Knowledge management field. It enumerates the definition, administrative framework and characteristics of Small and Medium Enterprises (SMEs) of India, importance of SME and auto component manufacturing firms. It focuses on the overview of the importance of Knowledge Management in Small and Medium Enterprises with relevance to Indian auto component manufacturing enterprises. It ends up with the purpose of the research study.

1.2 Backdrop of Knowledge Management

'We are entering (or have entered) the knowledge society in which the basic economic resource ... is knowledge ... and where the knowledge worker will play a central role ...' Drucker (1993).

Knowledge is an intellectual asset for each organization. The organization must know how to utilize this intellectual asset to improve their business productivity and reduce costs. To get the most value from a company's intellectual assets, KM practitioners maintain that knowledge must be shared and serve as the foundation for collaboration. Leveraging this knowledge within the organization gives a competitive edge. Intellectual capital, or employee knowledge and experience, is a vital corporate asset. KM seeks to best use that asset through knowledge sharing and documentation.

It is imperative to acknowledge the knowledge sharing activities to enhance day-to-day tasks in organization. This research study opens a room to explore the elements of knowledge management practices and its usage for better knowledge responsiveness.

It demonstrates that knowledge management process and the way it is practiced is crucial and shall lead the organization to a better knowledge access and application of these for organizational effectiveness.

An increasing amount of studies are being conducted and published examining primary issues in relation to knowledge management practice and the element of human resource that are connected to it (Polanyi, 1966; Nonaka and Takeuchi, 1995; Davenport, 1998, Zack, 1999; Prusak, 2000). Consequently, the role of knowledge in organizational survival is considered as crucial factor in many organizations who understood the demand of knowledge economy. In the same way (Davenport and Prusak, 1998) research study found that knowledge is the only source of sustainable competitive advantage and (Senge 1990) states that an enterprise market value is increasingly dictated by its intellectual capital.

Knowledge management is a key concept in today's business world. Evidence of this fact is apparent if one only peruses the current business, management, and organization literature. On the surface, it looks as if knowledge management just appeared toward the end of the 1990's. Some regard knowledge management as a business fad or craze (Swan, Newell, Scarbrough, and Hislop, 1999, p. 275), but a closer examination of the concept reveals that there has been considerable thought and research into it, and many of the world's most successful corporations, businesses, and organizations are investing considerable resources in this enterprise (Alvesson and Karreman, 2001, p. 995).

Knowledge is increasingly recognized as a key business imperative and has positive impacts for organizations in terms of efficiencies, effectiveness and competitiveness (Alavi and Leidner 2001, Grover and Davenport 2001). While there are many reasons for pursuing knowledge management (KM), many organizations contend that KM can lead to significant improvements in current operational performance, future capacity and adaptability to changing customers' needs and market conditions (Cross and Baird 2000, Earl 2001). Prior research and surveys conducted by business consultancies and research firms (Ezingeard, Liegh, and Chandler-Wilde 2000, KPMG 2000) also indicate that many organizations have already addressed KM as an

integral part of their business agenda in a more rigorous and formal way than before. Research studies from various disciplines or with different perspectives demonstrate a growing interest towards KM and manifest multi-faceted concepts and ideas such as knowledge classification (Earl 2001, Holsapple and Joshi 2001), KM factors (APQC 2001, Holsapple and Joshi 2000), KM technology (Hahn and Subramani 1999, Marwick 2001) and KM strategy (Choi and Lee 2001, Zack 1999).

Prusak (1999) estimated that approximately 80% of the Global 1000 businesses are conducting knowledge projects, and that "approximately 68% of the Fortune 1000 has defined knowledge projects underway. Many of the practices set up in organizations can be broadly construed as contributing to the knowledge agenda. These knowledge projects range from setting up an intranet, using Lotus Notes or other team-oriented software, creating personal development plans, mentoring, or sharing information on best practices. Increasingly, organizations are creating specific initiatives or programs with a knowledge focus. Knowledge teams and knowledge leaders are emerging, but very few organizations are applying knowledge management throughout their organizations.

Why are businesses and organizations devoting considerable money, time, and effort into knowledge management projects? The answer is they want to survive. McCampbell, et al (1999) maintain that in an economy of uncertainty, the only sure source of lasting competitive advantage is knowledge. "Successful companies are those that consistently create new knowledge, disseminate it widely throughout the organization, and quickly embody it in new technologies and products"(p. 172). They argue that the new business environment is characterized by radical and discontinuous change. The environment requires organization members to anticipate changes and carry out a faster cycle of knowledge creation and action based on the new knowledge (McCampbell et al., 1999, p. 173).

Operating any organization in the information age is a challenge made more difficult by the instantaneous nature of the flow of information. Drucker (1993) calls our world a post-capitalist society, and in his writing about the economic, political, and social transformation's taking place, he identifies a primary characteristic and

resource – knowledge. The post-capitalist society differs from past eras in how knowledge is applied. In the early part of the 20th Century, the industrial revolution applied knowledge to the use of tools, processes and products. The productivity revolution began when people applied knowledge to human behavior. Post-capitalist society is characterized by the fact that knowledge is being applied to knowledge itself (Uit Beijerse, 1999, p. 96). As Skyrme and Amidon (1999) wrote, "the knowledge agenda is new, yet not new". Most organizations are already involved in managing knowledge and have been for a long time. Many of them, however, do not realize the full extent of what they are undertaking.

In today's knowledge era, not only it is a need for larger organizations but it is a need also for Small and Medium Enterprises to practice knowledge management process. The knowledge that is available within the organization are to be managed to improve organization efficiency. Such an environment and culture will deliberately and systematically help to share information and knowledge with each other which will reduce error, save valuable planning time, and better individual and organizational performance. Knowledge acquisition, knowledge storage, knowledge sharing and its application in problem solving and decision making processes not only help to deal with environmental issues but also encourages new innovations to be created, shared, learned, enhanced, organized and utilized for the benefit of the organization to increase competency in the organization.

The discipline of knowledge management is now a well-established discipline in many large organizations. But what is its current status and role in needs in small and medium enterprises to be investigated. This research explores the above question and it is a survey of SMEs in Pune Region to exemplify the key knowledge management processes (1) knowledge capture and acquisition, (2) knowledge storage and preservation, and (3) knowledge sharing in the auto component firms. This research tries to understand the level of Knowledge Management followed in SMEs. It makes a study of adoption of the Knowledge Management process and practices in the strategic and operational levels of SMEs. It identifies whether a formal or structured approach of KM is being practiced in SMEs and explores to know to what extent information and communication technology is being used for knowledge capture and

acquisition, knowledge storage and preservation, and knowledge sharing and makes a comparative study of Knowledge Management Practices between SMEs and large auto component manufacturing organizations. It also proposes a framework model and strategy for Knowledge Management practice for SMEs in this sector.

This study also aims to examine the influence of KM enablers - Culture, Leadership, Employee participation, Rewarding with incentives, Training and technology, KM strategy and Information and Communications Technology (ICT) on KM processes such as knowledge capture and acquisition, knowledge storage and preservation, and knowledge sharing specifically in the SMEs. The findings of this study will be useful to SMEs, serving as a guideline to become more competitive.

1.3 Knowledge and Types of Knowledge

1.3.1 Knowledge

It is through knowledge that we create meaning for the objects or events that we see around us. It is convenient here for us to define an object or event in terms of a structured narrative, which for the moment we shall define as a reflective experienced coherent story. According to (Schutz and Luckmann 1974) in their studies on life world, meaning can be attributed to a narrative when a viewer has a knowledge schema (that is having an underlying organizational pattern, structure, or conceptual framework of knowledge). A knowledge schema consists of an ordered experiential stock of knowledge that provides us with a cognitive *relevance* for the narrative. There are three classes of relevance all of which are interactive, and all of which maintain their own stock of knowledge:

- Thematic relevance, which occurs when a narrative (with its own characteristics that distinguishes one theme from another) can be expressed, and that determines the constituents of an experience.
- Interpretative relevance, which occurs when the narrative can create direction by the selection of relevant aspects of a stock of knowledge.
- Motivational relevance, which occurs when consideration of the narrative causes a local conclusion through action.

There is more to these classifications and their connections to knowledge and meaning than can be indicated here. However, we have enough to relate them usefully to a proposal by (Marshall, 1995), who suggests that schema have four categories:

(1) Mental organization of individual's knowledge and experience that allows a cognitive being to recognise experiences that are similar.
(2) Access to a generic framework that contains the essential elements of all these similar experiences.
(3) Use of this framework to plan solutions.
(4) The ability to utilise skills and procedures to execute the solution.

Marshall uses this definition for schema because it then enables the identification of a knowledge typology, which we shall reduce to three essential elements:

- Identification knowledge – the facts and concepts making up the knowledge domain
- Elaboration knowledge – the relationships between the individual knowledge components and the way they are organized (including the capacity to plan)
- Execution knowledge – the conceptual skills and procedures required to execute an activity

The relationship between the Marshall and the Schutz and Luckmann typologies can be expressed as follows:

- identification knowledge and thematic relevance are connected in that a narrative must be recognisable through the concepts that it entails;
- elaboration knowledge and interpretive relevance occurs through the creation of direction, when the selection of relevancies that relate to an event is essential in that elaboration requires interpretation;
- execution of knowledge and motivational relevance can be related in that execution is a natural consequence of the active conclusion of a narrative.

Clearly the relationship between the two typologies is not simple and linear. Rather, they should be seen as contributing to a compound typology that is enriched.

While we have explained how meaning and knowledge are related, we have not entered into a definition for knowledge. According to the (Webster College Dictionary, 1990 edition), the definition of knowledge includes the following associations: information; acquaintance with facts, truths, or principles; familiarity or conversance, as by study or experience: a knowledge of human nature; the fact or state of knowing; clear and certain mental apprehension; awareness, as of a fact or circumstance; something that is or may be known; the body of truths or facts accumulated in the course of time; the sum of what is known.

The idea that knowledge is information is less than adequate a definition and we shall explore this in more detail shortly. Neither, however, is it adequate to simply define knowledge in terms of facts. This will be clear when *ontological* considerations are made, providing an exploration of the nature of reality. Positivists seen reality as a given that can be represented through the collection of facts, now used to validate that given view of that reality. From a critical perspective, the nature of facts very much depends upon the context and frame of reference from which one views them. Stafford Beer has called facts "fantasies that you can trust". Now, trust is (Concise Oxford English Dictionary, 1959 edition) "a firm belief in the honest, veracity, justice, strength, etc., of a person or thing". Since trust occurs through belief, it should be realized that it can vary from individual to individual, from group to group, or from time to time. Beliefs are also culture based.

From the literature, definitions of knowledge vary widely. Furthermore, many articles in the KM field often confuse knowledge with information, as identified by (Wilson, 2002 and Firestone 2001a), and thus add to a certain degree of confusion and epistemological conflict. Starting from the basic, the Cambridge International Dictionary of English defines knowledge as: understanding of or information about a subject which has been obtained by experience or study, and which is either in a person s mind or possessed by people generally. Post-modern schools of thought hold

that knowledge of the world is not a simple reflection of what there is, but a set of social artifacts; a reflection of what we make of what is there (Schwandt, 1997).

In other words, there is a meaning that people in organizations attach to acquired knowledge and information that is associated with their work practices and experiences, as well as their work environment and culture. Knowledge Management therefore is management of such understandings, artifacts and information sources. However, this very generic definition will be interpreted by different individuals according to their perspectives, epistemological assumptions, and specialization. Consequently, this definition would mean different things to different people. In fact, KM itself is not without contradictions at both epistemological and philosophical levels. Authors such as (Wilson, 2002) and Drucker as quoted by (Kontzer, 2001) discredit the concept of managing knowledge arguing that it is not possible to manage what is internally constructed by an individual.

1.3.2 Types of knowledge

Nevertheless, and despite the more purist philosophical conceptualizations of knowledge, the literature in KM distinguishes different types of knowledge in order to be able to propose its management. Not negating the internal nature of knowledge creation and construction, KM authors prefer to focus on the nature of the captured knowledge that emerges from the process of knowledge extraction and acquisition. (Wilson 2002) and most of the social constructivist and postmodernist philosophers would argue that once extracted this knowledge is but mere information and heuristics. Most KM authors do not intrinsically disagree with this, however they argue that if this knowledge exists in the organization, namely between [the] two ears (Kontzer, 2001) quoted (Drucker, 2001) of its employees, then the KM process aims at extracting, representing, and acquiring this knowledge. KM authors divide and typify knowledge in different ways. For example, some authors differentiate technical and strategic types, (Liebeskind, 1996). (Grant, 1996) proposes practical knowledge, intellectual knowledge (scientific, humanistic and cultural), pastime knowledge (news, gossip, and stories) and undesired knowledge. Finally, the more common characterization of knowledge is tacit knowledge, explicit knowledge and implicit

knowledge (Srikantaiah and Koenig, 2000, p. 223; Nonaka, 1994; Nonaka and Konno, 1998; Cavusgil et al., 2003).

Explicit knowledge

Explicit knowledge can be formalized and represented, and thus articulated in formal languages. This is the type of knowledge that most critiques of KM equate to information (e.g. Wilson, 2002). As information, explicit knowledge can be easily stored, retrieved, shared and disseminated within organizations. Some of the examples of explicit knowledge are found in commercial publications, e-mail, internet, GroupWare, intranets, database, organizational business records and self-study material (Srikantaiah and Koenig, 2000 p.11). The management of explicit knowledge usually includes the creation, generation or acquisition of that knowledge and should be supported by a number of information and communication technologies (ICT). According to (Srikantaiah and Koenig, 2000, p. 270) these include. Codification and organization; Access and dissemination; and use and application.

Tacit knowledge

According to (Ryle, 1984, pp. 25-61), the distinction between tacit knowledge and explicit knowledge has sometimes been expressed in terms of knowing-how and Knowing-that respectively; or in terms of a corresponding distinction between embodied knowledge and theoretical knowledge (Barbiero, 2002). On this account knowing-how or embodied knowledge is characteristic of the expert, who acts, makes judgments, and so forth without explicitly reflecting on the principles or rules involved. The expert works without having a theory of his or her work; he or she just performs skillfully without deliberation or focused attention. Knowing-that, by contrast, involves consciously accessible knowledge that can be articulated and is characteristic of the person learning a skill through explicit instruction, recitation of rules, attention to his or her movements, etc. While such declarative knowledge may be needed for the acquisition of skills, the argument goes, it no longer becomes necessary for the practice of those skills once the novice becomes an expert in exercising them, and indeed it does seem to be the case that, as Polanyi argued, when we acquire a skill, we acquire a corresponding understanding that defies articulation

(Barbiero, 2002). The term tacit knowledge was first coined by (Polanyi, 1958) and refers to hidden or nonverbalised intuitive and unarticulated knowledge (Cavusgil et al. 2003). The idea that certain cognitive processes and/or behaviors are under-girded by operations inaccessible to consciousness (Barbiero, 2002). More pragmatically, tacit knowledge can be described as experience that is embedded in an individual such as perspective and inferential knowledge. It includes insights, hunches, intuitions, and skills that are highly personal and difficult to formalize, and as a result are hard to communicate or share with others. Tacit knowledge therefore cannot be easily codified and thus is not readily transferable from one person to another. It can only be learned by close association over an extended period of time. The core differentiation between information management (IM) and KM lies in the Knowledge management issues 105 assumption that tacit knowledge forms the basis of intellectual capital of organizations (Srikantaiah and Koenig, 2000, p. 223) and needs to be expressed and managed. Traditionally, IM authors do not consider tacit knowledge in their frameworks and models and focus on explicit knowledge alone. Explicit knowledge is relatively uncomplicated, therefore, it is with tacit knowledge that KM enters into a new and unexplored field. According to (Srikantaiah and Koenig, 2000, p. 11) and (Nonaka, 1991) explicit and tacit knowledge have a symbiotic relationship where the each contribute or benefit from the other. In order for KM to be effective it is essential that both explicit and tacit knowledge are present in the organization s infrastructure. This infrastructure may include benchmarking, training, sophisticated information technology and a basis of trust and will vary depending on the complexity of the organization and its goals and objectives.

Implicit knowledge

Nevertheless the concept of tacit knowledge is not accepted without discussion by the opposing sides in the KM debate. In fact, (Wilson, 2002) distinguishes tacit and implicit knowledge as follows: Implicit knowledge is expressible; tacit knowledge is not. Thus tacit knowledge can be translated into workplace heuristics and mnemonics that becomes implicit knowledge that is, implicit knowledge is knowledge which is hidden within procedures and management and work practices of the organization. It

may include human experiences, informal representations, such as images and visions and formal inferences from explicit knowledge.

1.4 Knowledge Management

The study of knowledge dates back to ancient Greece. Even before that, knowledge was at least implicitly managed as people performed work. Early hunters, for example learned the best skills and practices for a successful hunt. These skills and techniques transferred from one generation to the next. This illustrates the transfer of knowledge, a knowledge management activity. (Wiig, 1997, p. 7).

The actual study of knowledge management is much more recent. (Drucker, 1999) argues that knowledge management is based largely on the work of Frederick Winslow Taylor, who studied manual workers (p. 79). During the 19th Century, economists argued about differences in the skill level of workers. When considering productivity, they categorized workers as either hard workers or lazy workers. Taylor did not agree with this line of thought and examined the inefficiencies in how workers performed their jobs. He did this by recording motions necessary to accomplish the task and then eliminating unnecessary steps and then designing or redesigning tools, if necessary, to assist the worker in accomplishing his task. Taylor found that the traditional tools were not always the best tools for the job, and he received input from the workers on what might work better. Taylor pointed out that very little skill is involved in production. He claimed that what makes workers productive is knowledge. (Drucker, 1999, pp. 79-81). While the names for this emerging discipline have changed and the concepts and theories have evolved over the years from Taylor-Task Analysis to Task Management to Scientific Management to Industrial Engineering, Drucker argues that Taylor's work is the foundation of knowledge management (p. 80).

Knowledge is not easily measured or audited, so organizations must manage knowledge effectively in order to take full advantage of the skills and experience inherent in their systems and structures as well as the tacit knowledge belonging to the employees of the firm. Knowledge management is a managerial activity which

develops transfers, transmits stores and applies knowledge, as well as providing the members of the organization with real information to react and make the right decisions, in order to attain the organization's goals".

In general, KM in organizations should be seen as the process of critically managing knowledge to meet existing needs, to identify and exploit existing and acquired knowledge assets and artifacts and to develop new knowledge in order to take advantage of new opportunities and challenges (Quintas et al., 1997). In holistic terms, KM must be seen as a strategy to manage organizational knowledge assets to support management decision making, to enhance competitiveness, and to increase capacity for creativity and innovation (Zyngier et al., 2004). In operational terms, (De Jarnett 1996) proposed KM as a cycle that starts with knowledge creation, which is followed by knowledge interpretation, knowledge dissemination and use, and knowledge retention and refinement.

KM and knowledge intensive organizations, in relation to KM, (Prichard et al. 2000) argue that in addition to interest and dissemination undertaken by the consultancy companies, KM has grown because of the emergence and reproduction of research from established academic institutions which gave the concept important credibility. But realistically, KM emerged mostly due to the era of downsizing that characterized the 1980s and early 1990s, when companies where aiming to achieve a leaner organization with fewer employees, through outsourcing of services and systems. In addition to the reduction in the staff force, mergers and acquisitions where forcing employers to realize that the knowledge gained and developed over the years with their long-term employees was being lost through early retirements and redundancies. This phenomenon was particularly important for knowledge intensive organizations that were losing their chief assets when employees left. As defined by (Alvesson, 1995, p. 6), knowledge-intensive companies as opposed to labor-intensive or capital-intensive companies are characterized by the following factors: significant incidents of problem solving and no standardized production; creativity on the part of the practitioner and the organizational environment; heavy reliance on individuals (and less dependence on capital) and a high degree of independence on the part of the

practitioners; high educational levels and a high degree of professionalization on the part of most employees; traditional concrete (material) assets are not a central factor.

The critical elements are in the mind of employees and in networks, customer relationships, manuals and systems for supplying services; and. Heavy dependence on the loyalty of key personnel and- this is the other side of the picture considerable vulnerability when personnel leave the company. Consequently, the potential loss of key personnel lead to the fear that the organization could lose their competitive edge, which was dependent on the knowledge acquired and developed by these employees. This is particularly crucial for SMEs, which traditionally rely heavily on particular individuals and lack the recruiting capacity of large organizations. Realistically, this was the main reason behind the development and growth of KM concepts, models and systems. Companies soon discovered that there is a need for systems that enable the retention and exploration of knowledge developed in the organization over time by these key personnel and to develop and establish methods which allow for the sharing of this knowledge (Prichard et al., 2000, p. 3; Srikantaiah and Koenig, 2000, p. 11).

Theoretically, and as defended by most KM authors, these knowledge acquisition, storing, retrieving and sharing processes should be seen as crucial and core by knowledge intensive companies, notably by SMEs. However, in practice, SMEs are still very reluctant in taking KM principles in their strategic thinking and daily routines (McAdam and Reid,2001; Sparrow, 2000).

There are many interpretations of knowledge management, and of how to describe computer systems to support it in companies. In 1974, the book "The Corporate Memory" was published (Weaver and Bishop, 1974), arguing on the benefit of collecting information from different sources in a company and making it "searchable". At this time, the information was gathered on paper, and "search" would mean to submit a form to a department who would manually search through their files. The word corporate memory is still in use, but now meaning a database for storing documents from many people in a company. The word "corporate brain" is also used to describe such a database. Another related word is "organizational

memory", which does not really have a clear definition, but "intuitively, organizations should be able to retrieve traces of their past activities, but the form of this memory is unclear in research literature. Early efforts assume one could consider memory as though it were a single, monolithic repository of some sort for the entire organization" (Ackerman and Halverson, 2000). Many see this term as meaning both a process of collecting and using information as well as a repository.

Thomas Davenport has defined it as "a method that simplifies the process of sharing, distributing, creating, capturing and understanding of a company's knowledge" (Davenport et al., 1998a).

If we look a bit more into knowledge management, we find that some important aspects are to (Wiig, 1995):

• Survey, develop, maintain and secure the intellectual and knowledge resources of the enterprise.

• Determine the knowledge and expertise required to perform work tasks, organize it, make the requisite knowledge available, "package it" and distribute it to the relevant points of action.

• Provide (...) knowledge architecture so that the enterprise's facilities, procedures, guidelines, standards, examples, and practices facilitate and support active knowledge management as part of the organization's practices and culture.

While there are many organizations undertaking knowledge management projects, there is dispute over what exactly knowledge management is. Some in the field define knowledge management simply as information that has value for action, but others, like (Snowden, 1999), maintain that knowledge management is not that simple. He writes that it is the "identification, optimization, and active management of intellectual assets, either in the form of explicit knowledge held in artifacts or as trait knowledge possessed by individuals or communities". (Swan et al. 1999) explain that knowledge management is about harnessing the "intellectual and social capital of individuals in order to improve organizational learning capabilities, recognizing that

knowledge, and not simply information, is the primary source of an organization's innovative potential" (p. 264).

One cannot get a clear picture of knowledge management without studying the concepts of knowledge and information and other related terms. Much of the confusion that surrounds knowledge management is due to scholars' varied opinions on distinguishing knowledge from information. The misconception that the two terms are interchangeable can have disastrous effects in the business world. "The confusion between knowledge and information has caused managers to sink billions of dollars in information technology ventures that have yielded marginal results". (McCampbell et al., 1999, p. 172). (Snowden 1999) claims that it is not necessary to define knowledge, but points out that it is important to distinguish it from information (p. 52). Other researchers find it necessary to have a thorough understanding of all elements that make up knowledge management. (Davenport, De Long, and Beers 1998) claim that knowledge "is information combined with experience, context, interpretation, and reflection" (p. 89).

Knowledge as a human trait or attribute Prusak, (1999) (p. 4), distinguishing it from information in that only a human can obtain knowledge. For example, a bookshelf can contain many volumes of books on a particular subject. It can be said that the bookshelf contains a lot of information, but one cannot claim that the bookshelf is knowledgeable. (Sveiby, 1999) carries the definition a little farther by describing it as an activity and a "process of knowing" (p. 20). The term activity brings up the notion of action, which (Nurmi, 1999) mentions in his definition of knowledge: "Knowledge is something that is acted upon, that has an effect on the way things are. We are not interested in information that lies passive on shelves, in files, or in archives. A knowledge business is created when the know-how inside the firm and the needs of customers outside the firm meet". (p. 168).

Most researchers believe that the idea of management is something that makes common sense. There seems to be a general consensus among scholars that management involves planning, organizing, coordinating, and controlling work

(Alvesson and Karreman, 2001). " Knowledge management is the systematic, explicit, and deliberate building, renewal and application of knowledge to maximize an enterprise's knowledge related effectiveness and returns from its knowledge assets" (Wiig, 1997)

1.5 Why Knowledge Management?

Long before Knowledge Management became a term, the industrialist giant, Andrew Carnegie, said, "The only irreplaceable capital an organization possesses is the knowledge and ability of its people. The productivity of that capital depends on how effectively people share their competence with those who can use it." The author of modern management, Peter Drucker, wrote, "The basic economic resource—the means of production—is no longer capital, nor natural resources, nor labor. It is and will be knowledge." Even the genius of Charles Darwin makes the point, "It is not the strongest of the species that survive, nor the most intelligent, but the one most responsive to change." In this age, the only constant is change. Beside the well-known changes in technology, there are continuing changes politically, socially, and economically. The ability of an organization to stay current and stay relevant requires a core competence in Knowledge Management.

Knowledge Management can transform the organization to new levels of effectiveness, efficiency, and scope of operation. Through advancements in technology, data and information are readily available. The modern business manager can be able to discover and learn new measures, new technologies, and new opportunities, but this requires the ability to gather information in usable formats and disseminate knowledge to achieve the organization's objectives.

Knowledge Management is continually discovering what an organization knows—codifying tacit knowledge, Data Mining, and Business Intelligence; continually increasing what the organization knows—organizational learning and communities of practice, and continually organizing and disseminating explicit knowledge for use throughout the organization.

As organizations strive to improve their business performance and capacity for innovation, their attention is increasingly focused on how they manage knowledge. Experience has shown that successful KM implementations in business settings prioritize attention on soft issues - including human and cultural aspects, personal motivations, change management methodologies, new and improved business processes enabling multidisciplinary knowledge sharing, communication and collaboration - and sees technology as an enabler.

Despite this, most efforts so far at addressing the challenge of KM in business environments have typically taken a "technology-push" approach, concentrating major effort on putting in place IT tools that will "solve the knowledge creation, sharing and reuse problem". Given this, it has been the objective of this guide to investigate those soft areas related to KM which can be the subject of common approaches, good practice identification or standardization initiatives, and to situate and describe these in the wider organizational context. The overall intention has been to provide meaningful and useful guidelines to companies, and notably SMEs, as to how they might align their organizations culturally and socially to take advantage of the opportunities of knowledge sharing within and beyond their organizational boundaries.

These guidelines therefore take the form of a European Guide to Good Practice in KM which describes how to implement KM successfully within an organization, and lists the benefits awaiting those organizations that are able to do it. Through its soft, culturally focused approach, the guide aims to add value to other more technology-focused initiatives underway within companies and standardization bodies.

The overall result will be a greater complementary benefit for the companies, large and small. Identifying and developing good practices can be applied to all types of businesses, including SMEs, to ensure that these organizations can be assisted as they seek to put in place the cultural, human and environmental ecology necessary to take full advantage of their collective knowledge as they do business in the knowledge economy.

1.6 Indian Small and Medium Enterprises and its Importance

Administrative framework for MSME's

Government of India has set up a new governing body for promotion and development of Micro, Medium and Small Scale Enterprises via "MSME Development Act", which came into force from 2nd October 2006. The President under Notification dated 9th May 2007 amended the Government of India (Allocation of Business) Rules, 1961, by which, Ministry of Agro and Rural Industries (Krishi Evam Gramin Udyog Mantralaya) and Ministry of Small Scale Industries (Laghu Udyog Mantralaya) have been merged into a single Ministry, namely, "Ministry of Micro, Small and Medium Enterprises (MSME)". It designed and implemented policies and programmes through its fie ld organizations and attached offices for promotion and growth of MSME sector. The Office of the Development Commissioner (MSME) is an attached office of the Ministry of MSME, and is the apex body to advise, coordinate and formulate policies and programmes for the development and promotion of the MSME Sector. The office also maintains liaison with Central Ministries and other Central/State Government agencies/organizations financial institutions.

Definition of MSMEs in India

Micro, Small and Medium Enterprises have been recognized as one of the key sector for employment generation and overall economic development of our country. The Government of India has enacted the Micro, Small and Medium Enterprises Development (MSMED) Act, 2006 on June 16, 2006 which was notified on October 2, 2006. With the enactment of MSMED Act 2006, the paradigm shift that has taken place is the inclusion of the services sector in the definition of Micro, Small and Medium enterprises, apart from extending the scope to medium enterprises. The MSMED Act, 2006 has modified the definition of micro, small and medium enterprises engaged in manufacturing or production and providing or rendering of services. The Micro, Small and Medium Enterprises Development Act, 2006, was enacted to expand our focus to the entire gamut of micro, small and medium enterprises (MSMEs) both in manufacturing and service enterprises. This sector now

provides employment to nearly 60 million persons and account for nearly 45 % of India's manufacturing output.

In India, the enterprises have been classified broadly into two categories:

(i) Manufacturing; and

(ii) Those engaged in providing / rendering of services.

Both categories of enterprises have been further classified into micro, small and medium enterprises based on their investments in plant and machinery (for manufacturing enterprises) or on equipment (in case of enterprises providing or rendering services). The present ceiling on investments to be classified as micro, small or medium enterprises is as under:

Table 1.1: Present ceiling on investments for micro, small or medium enterprises

Classification	**Investment Ceiling for Plant, Machinery or Equipment***	
	Manufacturing Enterprises	**Service Enterprises**
Micro	Upto Rs. 25 Lakh (Us $ 50 thousand)	Upto Rs. 10 Lakhs (US$ 20 Thousand)
Small	Above Rs. 25 Lakh (Us% 50 thousand) and upto Rs. 5 crore (US$ 1 million)	Above Rs. 10 lakh (US $ 20 thousand) and up to Rs. 2 crore (US$0.40 million)
Medium	Above Rs. 5 crore (US$ 1 million) and upto Rs. 10 crore (US$ 2 million)	Above Rs. 2 crore (US $ 0.40 million) and up to Rs. 5 crore (US$ 1 million)
* Fixed costs are obviously higher		

Source: Micro, Small and Medium Enterprises Development (MSMED) Act, 2006

SME in India

The SME is a manifestation of India's socio-economic development model and has met with the country's long-term expectations in terms of contribution to Gross Domestic Product (GDP), industrial base, employment and exports. This segment forms a major part of India's industrial base. Recognizing the importance of SMEs in

the industrial development of the country, the Government has taken initiatives which are important in facilitating the growth of the SMEs. But it will be the internal dynamics of industries, and the path India's industrial development takes that will give a thrust to the emergence of SMEs. The auto component industry is one such sector that would give a major boost to SMEs.

In developing countries, SMEs are the major source of income, a breeding ground for entrepreneurs and a provider of employment. With various definitions by various countries, sometimes it becomes a difficult task for an individual to understand the importance of a SME. One may not know the important role that SMEs play in developing any particular sector, economy of any country, alleviating poverty, increasing employment, and, above all providing various items of daily use at an affordable cost. Within the last few years many developed and developing countries have realized the importance of the sector. Fast decision making due to less staff and more control of an entrepreneur, availability of raw material at your door step, innovative products which cater to the needs of a particular region and its vicinity, are certain key factors making SME's significant. Furthermore, economic factors which constitutes to the development of the sectors are as follows:

- Addition of output of goods and services to economy
- Low capital cost for establishment
- Reduction in income disparities
- Admirable propagation grounds for entrepreneurial talent

Year 2009 is a year to be remembered during the 21st century. The world has seen worst financial crisis in times gone by, making many developed and developing economies recreate a new policy in terms of managing crisis. In addition to that, increasing mercury of mother Earth has led to change in climatic conditions across the globe, inducing, wholesalers to re think about what worst perhaps come, and how by adapting some arduous measures, if applied, can give a better environment to our future generations to live in. SME's at their end, with innovative ideas helped to mitigate the situation. However, they lack in certain aspects. They are as follows:

- Technical Manpower
- Financial Aspect
- Technology Transfer
- Research and Development
- Lack of Education in terms of Policy, Labor Laws, Government Schemes

With the advent of planned economy from 1951 and the subsequent industrial policy followed by Government of India, both planners and Government earmarked a special role for small-scale industries and medium scale industries in the Indian economy. Due protection was accorded to both sectors, and particularly for small scale industries from 1951 to 1991, till the nation adopted a policy of liberalization and globalization. Certain products were reserved for small-scale units for a long time, though this list of products is decreasing due to change in industrial policies and climate.

SMEs always represented the model of socio-economic policies of Government of India which emphasized judicious use of foreign exchange for import of capital goods and inputs; labour intensive mode of production; employment generation; no concentration of diffusion of economic power in the hands of few (as in the case of big houses); discouraging monopolistic practices of production and marketing; and finally effective contribution to foreign exchange earning of the nation with low import-intensive operations. It was also coupled with the policy of de-concentration of industrial activities in few geographical centers.

It can be observed that by and large, SMEs in India met the expectations of the Government in this respect. SMEs developed in a manner, which made it possible for them to achieve the following objectives:

- High contribution to domestic production
- Significant export earnings
- Low investment requirements
- Operational flexibility
- Location wise mobility

- Low intensive imports
- Capacities to develop appropriate indigenous technology
- Import substitution
- Contribution towards defense production
- Technology – oriented industries
- Competitiveness in domestic and export markets

In spite of the limitations, the SMEs have made significant contribution towards technological development and exports. SMEs have been established in almost all-major sectors in the Indian industry. As a result of globalization and liberalization, coupled with WTO regime, Indian SMEs have been passing through a transitional period. Those SMEs who have strong technological base, international business outlook, competitive spirit and willingness to restructure themselves shall withstand the present challenges and come out with shining colours to make their own contribution to the Indian economy.

1.7 SME in India – Auto Components firms

Overview and evolution of the Automobile and Auto Components Sector

The liberalization of the Indian industry saw significant growth in the Indian Automotive Industry. Today, the Indian Automotive Industry is a significant contributor to the Indian economy, contributing nearly more than 5% to the country's GDP. With its wide penetration and strong influence on the country's economic and industrial development, the auto sector is indeed one of the major drivers of our economy. Moreover, economic liberalization coupled with its technological, cost and manpower advantage have made India one of the prime business destination for many global automotive players. With its strong influence on the country's economic and industrial development it is indeed one of the major drivers of our economy. Moreover, economic liberalization coupled with its technological, cost and manpower advantage have made India one of the prime business destination for many global automotive players. The sector has moderate direct employment and significant

indirect employment; it is estimated that the sector provides direct and indirect employment to over 13 million people.

The Pre-1980s era was defined by a closed market, availability of outdated models and limited supply of vehicles leading to limited growth of the market. The industry was in its nascent stage without any significant players in the market and neither were there a significant base of customers. Automobiles were largely unaffordable and objects of desire for most people. This changed in the next few years of 1983 to 1993 wherein Maruti Udyog Limited entered the Indian Automotive Sector. The era saw the formation of several joint ventures in the space of commercial vehicles and auto components. With the de-licensing of the automotive sector in 1993, several global players entered the market as a consequence of which the market grew, leading to stiffer competition and a large variety of products for the customers to choose from - currently, the Indian customer has over 30 Auto Original Equipment Manufacturers (OEM's) to choose two wheelers, three wheelers and passenger vehicles.

Characteristics of the Indian Automotive Components Industry

The Indian auto component industry is a thrust sector in India. The direct employment generated by the medium and large firms in the organized sector is 250,000 man-years. Geographical spread of the industry in terms of location, over 70 percent of the automotive components companies are situated in either the northern or western regions. NCR/ Delhi, Pune, and Chennai-Bangalore have traditionally been the most important clusters for the automotive components segment in India.

There are over 500 small, medium and large players in auto components in the organized sector along with 6,000 ancillary units. Most of these companies in India are family-owned businesses. The unorganized sector predominantly caters to the aftermarket. Manufacturers in this sector operate independently with little investment and on a small scale. Most components required by the Indian automobile industry are manufactured locally. Imported automotive components include special steels and materials or high precision engineering components, such as gearboxes etc.

The Auto component Statistics (value in US $ billion) according to ACMA describes the investment growth rate of this sector has gone up from 21% in 2004-05 to 33% and turnover 9in US $ bln) has increased from 6.7% in 2003-04 to 26% which shows a drastic improvement in the sector.

Product categories of the Auto Components Segment

The Auto Components segment comprises of a host of products demanded by the Automobile segment. These products are classified by major functions which includes Engine and parts, transmission and steering parts, Suspension and braking parts, equipments, electrical parts and others.(ACMA). In terms of production of auto components, Engine and engine parts alone account for 31% of the production value of auto components, while Engine and engine parts and Transmission and steering parts stand next.

Auto component SMEs are one of the fastest growing within the SME category of industries. These units are key contributors to the total production of auto components and also have a significant share in the exports of the industry. As part of a highly fragmented industry, these companies mostly are part of the unorganized sector. They operate in a tier framework, and most of the companies in the SME segment are in the Tier II or below. Few of the suppliers to OEMs are medium scale enterprises. The SMEs are riding a boom phase, driven by demand from global auto manufacturers. The auto component firms has a maximum of three levels and the profile of people employed has experienced ITI's / workmen and few diploma holders in the supervisory level and further in the next level having workmen mainly in 12^{th} and below with few ITI's. The industry is undergoing a major restructuring and many existing companies are expected to move up in the value chain to a higher tier. Nevertheless, sustenance and survival still remains an issue of concern for these companies as they will have to absorb global best practices in this competitive environment.

Cost competitiveness, customer orientation, lead time, are some key factors the auto component SMEs will have to imbibe to survive in the new global set-up. At the same time, these companies face the limitations of being SMEs, like

- Low capital base
- Limited generation of surplus funds for re-investment due to tight working capital cycle
- Lack of awareness of business opportunities
- Inadequate exposure to international environment
- Limited geographical diversity of markets
- Obsolete Technology
- Poor infrastructure facilities

Despite these limitations, the SMEs have managed to significantly contribute towards development of India's industrial base. The key risks that the auto component SMEs faces include:

- Fluctuations in the cost of production; especially raw materials like steel, aluminum, polymers
- Poor negotiation power due to fragmented nature of industry; which in turn limits their pricing power
- Dependence on traders and agents to access overseas markets which threatens their competitiveness
- Product substitutes due to fast-changing technology

Addressing these challenges and risks will be crucial to promoting SMEs in the auto component industry. The government has initiated cluster-based development – geographical concentration of enterprises having similar lines of business – which give rise to external economies and favour emergence of specialized technical, administrative and financial services. This form of networking of small firms is a means of achieving economies of scale. Extending this initiative further, the government is encouraging banks to adopt a cluster-based lending approach to ease availability of funds to SMEs.

Entry of Multinational automobile manufacturers like Magna International of Canada, Delphi and Ford of US and some European companies into the Indian markets which bodes well for the auto component industry as it would enable the collective development of auto component SMEs. This has brought in better technology, skills, new products and an assured market. Strategic tie-ups and contract manufacturing is another way forward for SMEs in the auto component industry.

The outlook for the industry is bright and is expected to continue on a high-growth trajectory for the next 10 years. Capitalizing on this growth prospect will mean keeping pace with global developments and imbibing capabilities that will give an edge to Indian SMEs in surviving this rapidly changing competitive environment.

Table 1.2 : Auto Component clusters in India

State	Numbers
Andhra Pradesh	1
Delhi	1
Gujarat	5
Haryana	3
Jharkhand	1
Karnataka	2
Maharashtra	5
Madhya Pradesh	1
Punjab	4
Tamil Nadu	1

Source-www.dnb.co.in

Industrial hubs within Pune

In the course of the geographical survey of the district, it is realized that there were distinct hubs of industrial activities within the district; Most of the manufacturing industries are concentrated in and around the Pimpri, Chinchwad and Bhosari MIDC. There are several smaller industrial hubs that have formed around this Maharashtra Industrial Development Corporation(MIDC) area; these are at Tathavade, Chikhali, Moshi, Khadki, Dighi, Nigdi etc. The second big belt where the industry is concentrated is along the Pune-Chakan route. There is a high concentration of smaller

players in places such as Moshi, Chimbli, Kuruli, Khed, Mahalunge etc. Similarly, there is a lot of industrial activity along the Pune-Mumbai belt with the presence of industries right from Pimpri-Chinchwad Municipal Corporation (PCMC), Khadki, Dehu, Urse, Ambi, Talegaon, Kanhe, Takwe upto Lonavala. There is a presence of a lot of players at Pirangut and Urawade, very close to Chandni Chowk.

The Pune-Nagar belt is also an active hub of manufacturing activities. The main areas with industrial activities are Kharadi, Wagholi, Koregaon Bhima, Sanaswadi right up to the MIDC at Ranjangaon. In fact, there almost exists a golden industrial triangle between PCMC, Talegaon and Ranjangaon within which industrial development seems to be taking place at a feverish pace. The other belt that has developed well within Pune Municipal Corporation(PMC) limits is Mohammedwadi and Hadapsar. Pune-Satara Road stretching from Katraj, Khed Shivapur right upto Shirwal also has a fair mix of different industries.

Table 1.3: Main industrial activity in % of units in Pune District

Broad Areas	Percentage of units
PCMC	38.4%
Pune- Talegaon- Lonavala	8%
Pune-Alandi Markal- Moshi- Chakan	13.5%
Pune- Nagar Road- Ranjangaon	8%
Pune- Katraj- Khed Shivapur- Satara	4.5%
Hadapsar- Phursungi- Saswad	4%
Pirangut- Urawade	3%
Jejuri	0.8%
Baramati	1.9%
Kurkumbh	0.5%
Junnar	0.5%
City industrial estates and areas	12.2%

Source from - Industrial Directory of Pune, Mahratta Chamber of Commerce, Industries and Agriculture (2010)

The following are the locations where the main activity of manufacturing being carried out in Pune

Table 1.4: Manufacturing Activity in Pune District

Location	Area	Distance from Pune	Main Activity
Pimpri-Chinchwad	1200 hcts	18 kms	Auto, auto-Components, M/c tools, Machinery, engg.
Hinjewadi Phase I		15 kms	IT, ITES
Hinjewadi Phase II		16 kms	BT
Kharadi		10 kms	Software
Talwade	190 acres	18 kms	IT
Talegaon		37 kms	Floriculture
Ranjangaon		55 kms	White Goods
Chakan		30 kms	Auto and auto-components
Jejuri	118.37 hcts	48 kms	Mixed profile
Kurkumbh		75 kms	Chemicals Pharmaceuticals
Baramati		105 kms	Mixed profile

Source - Industrial Directory of Pune, Mahratta Chamber of Commerce, Industries and Agriculture (2009-10)

Based on the above facts this research focuses only on SME-auto components and concentrates on the Pimpri-Chinchwad and Chakan Industrial Area of Pune which is considered to be the biggest MIDC having the most of the auto components industries of Pune.

1.8 Knowledge Management Practices in SME

It is common knowledge that KM was originally mostly practiced in larger enterprises, with specific foci on issues such as culture, networking, and the development of organizational and technological infrastructures to accommodate KM initiatives, especially in large multinational environments. (Awazu and Desouza 2006:40) assert that SMEs knowingly or unknowingly manage knowledge intuitively in the right way, that is, the humanistic way, whilst (Furu, Salojarvi and Sveiby 2005:104) contend that although KM is practiced in small companies, SME managers do not necessarily know it as such, or call it knowledge management. Similarly, (Uit Beijerse's 2000:175) study on 12 innovative small companies in the Netherlands found no less than 79 different KM activities in these businesses. According to the same source, this was owing to the fact that SMEs have emerged as a business paradigm in today's knowledge economy. However, SME successes, and ultimately their growth, will determine to what extent they manage their knowledge work and thus knowledge sharing.

According to a recent study, many SME managers in German-speaking countries have come to realize and appreciate that the inventiveness and uniqueness of each of their knowledge workers would lead to customer satisfaction, as well as the success of the SME (Fink and Ploder 2009:37). Although these SMEs were often cash-strapped and did not have enough capital to invest in KM initiatives, it was necessary for them that their knowledge was leveraged optimally in order to achieve most of the goals of the enterprise. (Fink and Ploder's 2009) research also emphasizes the importance of capturing individual and organizational knowledge, which could result in gaining competitive advantage in SMEs, predominantly because human capital is the source of creativity in enterprises. Consequently, it is also imperative that a typical small enterprise's implicit or tacit knowledge should be converted to explicit formats in order to perform, store and retrieve functions to enhance organizational value (Bozbura 2007:210). In order to achieve this, enterprises should invest in their employees by means of training and mentoring. In other words, for KM to be successful, employees optimally should share both tacit and explicit knowledge and information within the organizational memory base. Tacit knowledge, which is

regarded as a key ingredient of socially constructed knowledge, is primarily captured by means of informational discussions in whichever formats. Because this knowledge resides within the minds of people and is therefore difficult to formalize, transfer or spread, it cannot be thought of or argued about in the same way as explicit knowledge. Thus, it seems less complicated to apply KM processes in small and medium companies because it is easier to capture tacit knowledge in less formalized (small) environments.

In his research on KM practices in Turkish SMEs, (Bozbura, 2007:211) emphasizes the importance of capturing and acquiring knowledge, which is gained by arranging and managing an organization's relationship with its customers, shareholders, suppliers, rivals, the state, the official institutions, society, and so on. His research reveals that their success can be attributed to four factors:

- training and mentoring of employees
- policies and strategies of KM
- knowledge capturing and acquisition from outside
- effects of organizational culture.

Empirical evidence from research conducted by (Chen *et al.* 2006:20) should also be taken in account. This research was undertaken amongst British SMEs in the service sector to identify their needs and practices regarding inter-organizational knowledge transfer. It showed that external knowledge was of paramount importance for SMEs. Their research also showed that customers had the biggest impact on SMEs and thus it is imperative for SMEs to develop and maintain good customer relationship management practices. Holding regular meetings with main customers and suppliers, obtaining advice from counterparts in other organizations and dealing with complaints, as well as engaging in social and electronic networking, are some of the ways in which inter-organizational knowledge transfer can take place in SMEs.

(Massa and Testa 2008:2) state that although information and data management are important aspects of KM, the latter involves broader issues, such as the creation of processes and behaviors that allow people to transform information within the

organization to enable them to create and share knowledge. Therefore, it is imperative that KM in SMEs should also include people, process, technology and culture.

The impact of communities of practice (CoPs) as vehicles for knowledge sharing in SMEs revealed that CoPs can be an effective KM tool for SMEs and defines CoPs as groups of people who work together with the aim of achieving specific goals by means of creating, sharing and leveraging information(Du Plessis, 2008). Although these groups of people are often from different backgrounds, they can work together towards achieving a common goal, using their knowledge, skills and abilities to achieve this. They also share a common concern or passion for what they do and each one brings unique skills to the CoP, which is then shared amongst members of the community. These members do not necessarily work together on a daily basis, but they benefit and find value in their regular meetings and interactions. They share information, insight and advice, explore new ideas and often act as sounding boards for one another. CoPs can be either technologically advanced, for example, they may use particular management systems, or they could be simplistic in nature, such as a group of like-minded people discussing a work-related problem, or seeking a solution with minimal or no use of technology. Some of the points extracted from Du Plessis's (2008:61–66) research focus on knowledge sharing and how CoPs can impact on SMEs in this regard, for example, (1) CoPs can assist in managing the knowledge sharing life cycle and (2) CoPs can serve as vehicles to combat knowledge loss.

Du Plessis's research shows the enormous impact that CoPs can have on SMEs, emphasizing the fact that knowledge is a definite factor for Competitive advantage in SMEs. In this research project, the researchers therefore also aimed to establish whether they could assist with the creation, sharing and leveraging of knowledge in these smaller communities, as well as whether they could assist these communities to cope with knowledge losses when employees retire or leave the organization. These and other research findings are discussed below.

Organizational knowledge, in the past decade, has become the most significant source of competitive advantage especially for SMEs. This phenomenon is mainly an effect of the rapid expansion of goods and factor markets further intensified by the fact that

SMEs compete with limited physical assets and are thus forced to maximize the utilization of knowledge: their most abundant internal resource (Desouza and Awazu 2006). In a global arena where better access to external resources is expected, organizational knowledge is identified as a strategic asset that is not easily imitated by the competition thereby providing a sustainable competitive advantage for the firm (Bollinger and Smith, 2001). This means that, in order for SMEs to succeed in their respective markets, they must ensure that they have control over their internal knowledge.

The task of administering organizational knowledge is not without its own difficulties however. With an increasing interest for individual entrepreneurship (Beijerse, 1999), SMEs continuously face the threat of losing part of their knowledge through leaving employees. Barchan states that when an employee leaves "...you lose more than that person's knowledge. You also lose any investments you have made in that person's professional development and competence—unless you find ways to capture it". It is important to note, however, that it is not only through a resigning employee that an organization can lose knowledge. Restructuring, where an expert in one department is transferred to another, can also cause the same effect. Another problem—particularly common in family-owned SMEs—is that of succession planning, or the lack of it, which can cause potentially irreparable damage particularly when the owner-manager leaves or dies (Wickert and Herschel, 2001). With so many significant threats, SMEs are compelled to manage their internal knowledge more instantly before it is lost forever.

Furthermore, it has also been seen that organizational knowledge, like any other resource in a firm, is also under threat from being lost either to competition or otherwise. With these present conditions surrounding SMEs, it is imperative that they maintain an appropriate level of control over what they know. The practice of knowledge management, which is focused on the acquisition, improvement, and retention of organizational knowledge, precisely meets the requirements of the SMEs and is thus a valuable tool for their sustainability.

Both large and small firms, require continuous generation, sharing and implementation of knowledge in order to maximize their competitiveness and survival chances in the modern information society (Nunes et al., 2006; Pillania, 2008b). However SMEs relatively need more focused approach towards KM as they face severe competition. (Saloja et al., 2005) described that a more conscious and systematic approach to KM enhance SMEs performance and competitive advantage. KM also promotes innovation and business entrepreneurship, help manage change, and empower employees (Nonaka and Takeuchi, 1995). (Zanjani et al., 2008) stated that SMEs need to make operational, tactical and strategic decisions and without accurate information they are unable to undertake this role.

The knowledge of employees of an organization is an important asset and such knowledge should be garnered for the ultimate good of the company. (Wong and Aspinwall, 2004) described two complementary perspectives about KM importance in SMEs. "Pull" perspective, which identifies the potential benefits or improvements that are crucial for small businesses, include for example improved competency, efficiency, innovation, learning and knowledge sharing. And "push" perspective, which deals with the external or environmental thrusts that push them to the forefront of KM, include amongst others, competitive pressure, globalization, movement of large companies toward knowledge based organizations (Davenport and Prusak, 1988).

There are some other underlying reasons for which SMEs need to manage their knowledge resources.

i) SMEs compete on the basis of their competencies and knowledge is an important resource to be competent, hence have to use knowledge more than traditional resources.
ii) The owner of SMEs, usually are also manager needs to transfer knowledge to employees.
iii) SMEs usually did not find or unable to retain good minds; hence they must settle for less qualified but motivated human resources.
iv) Key stake holders like lending institutions, investors, suppliers, and customers,

judged SMEs on the basis of their knowledge and strategies to put knowledge in right use. (Zanjani, Mehrasa and Modiri, 2008).

Another factor, which explains the emergence of KM concepts, is the continuous 'rightsizing' trend. Starting in the 1980s, corporate downsizing measures led to the loss of valuable information and knowledge resources and subsequently to the emergence of KM as strategic countermeasure.

The driving forces like globalization have lead individuals and organizations to appreciate the important role of knowledge in an increasingly competitive world market (Davenport and Prusak, 1988). SMEs as a part of business sectors are no different from any other business sector. KM plays an important role for many SME companies in gaining competitive advantage and business survival. Knowledge in a company should be properly managed and controlled to be effective and competitive, therefore, there is no excuse or option to them to manage individual and organizational knowledge to continuously improve their process and compete in market.

By and large, SMEs have a set of distinctive needs as described earlier that call for the deployment of a KM system for generating, sharing, and refining organizational knowledge. However, in practice, SMEs are still very reluctant to take KM principles into their strategic thinking and daily routines (McAdam and Reid, 2001; Nunes et al., 2006). SMEs usually lack resources such as land, labor, and capital. Therefore, SMEs must do more with less (Desouza and Awazu, 2006). SMEs need to be creative in working in order to manage knowledge with limited resources (Zanjani et al., 2008). Though SMEs in developing countries, in comparison with large enterprises are on back step for the availability of resources to manage knowledge. SMEs do have certain advantages in KM practice.

i) SMEs flat structure and short decision making process allows shorter and faster information flow which can improve communication, as well as easier to permeate new change initiatives.
ii) SMEs flexible culture provides a good foundation for a change, for example

the practices of quality initiatives.

iii) People dominated together with organic behaviour, rather than bureaucratic and system dominated, and this helps improve the chances of success for new initiatives.

iv) The high incidence of innovativeness can nurture a continuous improvement culture. Knowledge, if properly harnessed, enables SMEs to stand out in the competition and outperform their rivals, thus maintaining a competitive edge (Wong, 2005).

The results of knowledge management to date, however, have been largely inconsistent, if at all positive. Rosset (2002) estimates that the failure rate of KM within all types of organizations could be as high as 70%. On the other hand, this estimated value is just a percentage of those firms that have already implemented or attempted to implement knowledge management. The success rate of KM could be significantly lower than 30% if the entire population of SMEs is considered. If we are to take Wong and Aspinwall (2005) empirical study as an accurate representation of the SME population, or at least as a close approximation of it, then we would find that 76% of SMEs have not implemented any KM system in their respective organizations. Based on the above values, we can compute a success rate of 7.2%. From this we are able to obtain a first look at the positive effects of KM which is alarmingly low.

On the other hand, Wong and Aspinwall's research may be flawed in the sense that each respondent appear to have depended on his or her own definition of KM while answering the questionnaires. If this is the case, then a significant number of the respondents who claim to not implement KM may, in fact, be already be implementing it. The study by Desouza and Awazu suggests that this is the case by stating that all SMEs in their sample implemented KM in some form or another whether they knew it or not. Therefore, the positive effects of KM are probably more widespread than what the numbers are saying. On the other hand, it could also mean that since these organizations are not aware of what they are doing then they are not making the most out of what a full-blown KM system can do for them. Such cases are hard to prove at this point in time and more research on the actual impact of KM on

the SME sector may be necessary. On the other hand, we can probably say with some degree of confidence that while KM is making its way into SMEs and producing a number of positive results, the sector is yet to take full advantage of this relatively new concept.

There are many causes attributed to the low success rate of KM among SMEs. More prominent among them is the slow adoption by the sector which is, in turn, caused by a lack of understanding of KM itself. The study by Wong and Aspinwall (2005) found that most of the respondents did not implement KM because they were "unsure of its potential benefits" or "have never heard of it" or both. Ignorance of KM aside, we find that, among those who have employed it in their respective firms, the common reason for failure is the misunderstanding of the concept itself. "The biggest misconception...is that knowledge management is about technology" (Call 2005). One example of this comes from an article in the Canberra Times. In this entry the writer presents a KM system where, although he defines "system" in the widest sense comprising of people, procedures, documentation and technology, he proceeds to cite examples of various KM implementations that are limited to tools and technologies (Nielsen 2001). Those that do not have a clear understanding of KM often "buried their users in cool gadgets" rather than identifying the problem areas and providing appropriate solutions for them Call (2005). That is, organizations made the users adjust to the tools rather than designing tools to fit the users and how they worked. Wong and Aspinwall (2004), through their research, confirms these problems by showing that the majority of SMEs implementing KM do so by focusing mostly on technology. The top three solutions used by those interviewed were "Capturing knowledge electronically in a repository", "Using information technology to share and transfer knowledge", and "Using the intranet to publish and access information".

According to (Rothwell and Dodgson, 1994) SMEs has little management experience, power imbalance if they are to collaborate with large firms, difficulty in coping with complex regulations and associated cost of compliance. (Hylton, 2002) has indicated that SMEs are in need of knowledge management just as much as large enterprises. The reasons cited are that the world has changed rapidly over the past decade and continues to do so. There are more contenders for every dollar or profit, which put

great pressure on companies, large and small, to innovate and to develop products rapidly. Both innovation and rapid development require accelerated use of knowledge, knowledge that must be managed efficiently, effectively and securely. In this knowledge driven global economy, knowledge itself is a commodity that offers the only 'sustainable Competitive edge'.

To remain competitive, companies have to know something and then coordinate and use what they know, quickly. SMEs therefore must first know what their knowledge assets are then how to manage and make use of these assets to get maximum return. There are a plethora of knowledge management tools and solutions on the market. However, the increasing attention of knowledge management is unsurprisingly targeted at very large multinational organizations, with little at the small medium enterprises (SMEs); and especially less at auto component organizations.

Although introducing knowledge management systems into SME is a particular challenge because of the limited resources of these kinds of companies (Herrmann et al, 2007), the literature review on KM reveals that the most part of research in this field is focused on large companies. In fact, the understanding of the organizational theory and practice considerations of KM has mainly been derived from large company experiences. Consequently, the potential of KM seems not fully exploited by small firms and this is reflected in a literature void where little research contributions on this topic have been published. In addition, research on KM in SMEs highlights some relevant different features (Pillania, 2006 and 2008)

According to the review carried out by (Thorpe et al 2005), research on KM in the SMEs context may be broken down into three distinct fields:

1. the knowledgeable SME manager or entrepreneur;
2. the knowledge systems and routines embedded within the context of the firm and their immediate networks;
3. the institutional and policy framework that is intended to support knowledge production within SMEs.

As asserted by (Frey, 2001), although major corporations have led the way in introducing and implementing KM, it is increasingly important for small businesses to manage their collective intellectual assets. In KM practices, issues that small businesses will face will not be simply a scaled-down replica of large-company experiences (Sparrow, 2001). (Desouza and Awazu, 2006) discuss five key peculiarities that differentiate knowledge management practices in SMEs and larger companies:

- In SMEs there is lack of explicit knowledge repositories. Instead, each manager/owner acts as the knowledge repository.
- Common knowledge possessed by members of the SMEs is deep and broad. This common knowledge helps in the organization of work by easing issues of knowledge transfer, sense-making, and application.
- SMEs by their nature and due to deliberate mechanisms are skilled at avoiding pitfalls of knowledge loss. The close social ties between members of the SME act as a deterrence against employees leaving the business. In cases where employees do leave the business, there are plenty of available knowledge resources that can be mobilized to quickly fill the void.
- SMEs have a knack for exploiting foreign sources of knowledge. Since they are resource constrained, and cannot spend efforts to create knowledge, they look outside the organization for knowledge.
- SMEs knowingly or unknowingly, manage knowledge the right way – the humanistic way.
- Technology is never made part of the knowledge management equation. The use of technology in an SME is mostly limited to acts of automation (such as the use of cash registers) and at times for informative purposes (storing of employee contact information in databases).

Similarly, (McAdam and Reid, 2001) firstly describe the key dimensions of KM (knowledge construction, knowledge embodiment, knowledge dissemination and knowledge use/benefit) and then, for each dimension, conduct a comparison between large firms and SMEs.

(Sparrow, 2001) indicates four components that figure strongly in small firm knowledge projects:

- the appreciation of personal and shared understanding;
- knowledge bases and knowledge systems;
- the integrated and contextualized action needed for knowledge projects in SMEs, and
- the knowledge and organizational learning processes in SMEs.

The author also suggests an emergent model of approaches towards developing knowledge management practices in SMEs. The model has as its most central tenet, the assertion that KM development in SMEs needs to be supported through a process that recognizes and incorporates the current thinking and priorities in the knowledge project.

The knowledge generated in SMEs is tacit in nature due to various reasons. In the context of SMEs some elements of KM are practiced but in an 'ad hoc' fashion. Indeed any technological infrastructure that is put in place to support KM must be adapted to the organization's needs and not the other way round. (Egbu et al. 2005)

Another stream of KM research regards factors that can influence the success of KM implementation. Also in this area, most of research efforts are heavily focused on large companies as early adopters and superior performers of KM were large and multinational corporations. As such, existing factors are mainly large companies oriented, thereby reflecting their situations and needs. Directly applying these factors into the SMEs environment may not be sufficient without an understanding of their very own and specific conditions (Wong, 2005). By integrating the common factors and introducing some new ones, (Wong, 2005) and (Wong and Aspinwall, 2005), propose a more comprehensive model for implementing KM in SMEs based on the following 11 factors:

- management leadership and support;
- culture;
- IT;

- strategy and purpose;
- measurement;
- organizational infrastructure;
- processes and activities;
- motivational aids;
- resources;
- training and education; and
- Human resources management.

The above set of critical success factors is important because of it can act as a list of items for SMEs to address and deal with when accomplishing KM. This helps to ensure that essential issues and factors are covered when small firms are planning and developing a KM strategy. It can also provide a basis for them to evaluate their KM practices (Wong, 2005).

Owners and managers of SMEs differ in what they term success. Survival and continuity, profit, return on capital employed, numbers of employees and customers, pride in product, skills and service, employment for family members, and enjoyable work life, are frequently mentioned criteria. Knowledge will tend to play a more significant role whenever change, innovation and growth are being pursued in a competitive and complex field.

A qualitative study through focus group discussion was done on KM in SMEs of industrial area in Bhopal by Mr.Ankush Sharma discusses the following:

There are two issues for KM strategy :

1. Management of Explicit knowledge which are available in databases, documents, policy, procedure etc. and effective practicing of this explicit knowledge.
2. Management of Tacit knowledge which is skills of the people and how effectively that could be exchanged more naturally and systematically.

The study was done by taking into different levers of knowledge strategy and different dimensions of KM which explains that its development through the KM process, it is possible to identify the leverage and benefits, and so attract and retain resources. This was a research paper which was not empirically tested by setting the hypothesis and more qualitative in nature. Based upon the literature noted in the preceding pages, one can argue that there is a need for all business firms to enhance individual and organizational knowledge. This enhancement is thought to lead to an overall productivity and competitive advantage in the marketplace. Most of the study was done on larger organizations but one could also argue that the same practices can lead to overall productivity and competitive advantages for all organizations including SMEs.

Knowledge storage and access in automotive components' SMEs in India by (Rajesh K. Pillania, 2008) is a research work looks at knowledge storage and access practices in small- and medium-sized enterprises (SMEs) in the automotive components industry in India. International SMEs fare better than Indian SMEs in stored knowledge in terms of relevance, importance and timeliness as well as access. Knowledge is mostly stored electronically and on paper. In terms of access, knowledge about markets takes maximum time whereas knowledge about the company's products/services takes minimum time. The study includes both macro and micro perspectives by covering experts as well as firms.

"KM in SME-A balanced combination of management support, technology, and organizational structural factors is necessary for successful knowledge management program implementation" describe that Knowledge has long been recognized as a crucial competitive tool for organizational survival and competition (Ivy Chan *and* Chee-Kwong Chao, 2008). In practice, many organizations that are adopt in leveraging and capitalizing their knowledge resources experience business success and performance improvement. Despite dedicated attempts to follow the prescribed knowledge management (KM) guides and success path, small and medium-sized enterprises (SMEs) often encounter uncertainties and face the threat of possible failure or unmet KM results, which are little known and attended. This study on KM

capability was motivated with a view to filling this knowledge gap and in consideration of the important economic role played by SMEs in many countries. In Hong Kong, SMEs represent 98% of business establishments and 50% of total employment according to Hong Kong Government statistics circa 2007. In comparison with the large enterprises, SMEs could be even more nimble and flexible in adapting their systems and structures for KM purposes, with fewer problems of communication, implementation, and replacement costs.

As suggested by Gold et al.(2001), effective KM is primarily influenced by two types of KM capability—infrastructure and process that have to be deployed and harnessed to sustain organizational competitiveness. This article reports the findings of survey research that adapts the measurement items from Gold et al. The sample is drawn from 68 SMEs with KM initiatives launched in the past few years. In this study, any organizations that employ fewer than 200 employees as SMEs were considered. The results showed the mere presence of KM awareness or KM operation plans are no guarantee the KM programs will automate and be successful as expected. Organizations must harness a balanced deployment of culture, technology, and structure infrastructure, together with adequate capability to acquire, combine, apply, and create knowledge.

Large multi-national enterprises (MNEs) are unsurprisingly giving increased level of attention towards knowledge management, while very small at the small and medium enterprises (SMEs) and even fewer at construction-related organizations. But one thing should be kept in mind that SMEs is not the small MNEs and many SMEs don't want to be MNEs. To understand the difference between SMEs and MNEs, these are like different animals who want to succeed while existing in different habitats, and behaving in diverse ways. Both have changed approaches and require different sources, different types of knowledge and technology to stay nourished and healthy. We can compare the level of resources between MNEs and SMEs and as a matter of fact by 2002, almost ninety-nine percent of the construction companies in United Kingdom have less than 59 staff and these companies employ almost 62% of the industry's workforce and deliver 44% of the industry work load in terms of monetary

value (Collis, 2003). On the other hand, SMEs are generally technologically weak, they are not capable to invest huge amount in innovation and development, and they also adopt a less-formal strategy in management.

Due to inadequate resources available for SMEs, the employees should have a wide variety of skills and expertise in order to take several tasks. The knowledge here in SMEs also tends to be small, oral, tacit and contextual and always anticipate some instant results that can be utilized straight away. There are a number of knowledge management conceptions arose from MNEs may or may not affect SMEs. So for SMEs there is a burning necessitating building up knowledge management approaches appropriate for them. But this must be bore into mine that these approaches must be easy, straightforward and well-organized in order to support employees. Involvement and maximize the advantages of knowledge management (Alazmi and Zairi, 2003). This particular field of managing knowledge assets may also provide small firms new tools for survival, growth and maintaining a sustainable competitive advantage (Omerzel and Antoncic, 2008). The most part of the literature review on KM reveals that intensive research in this field is focused on large organizations. As a result of which the potential and the effectiveness of KM seems not fully exploited by these SMEs.

SMEs have to look outside the organization, as they cannot spend efforts to create knowledge. There is less use of technology in SMEs and they use technology which is very limited (such as the use of cash registers) and for informative purposes (storing of employee contact information in databases). The nature of knowledge generated in SMEs is tacit due to a variety of reasons (Egbu *et al.*, 2005). Some elements of KM are practiced in SMEs but in an ad hoc manner. As most of the research efforts are heavily focused on MNEs. But direct use of KM practices of MNEs into the SMEs environment may not yield sufficient output without proper understanding of their very own and specific conditions and environment. Where knowledge management maturity is high, there the firms are realizing handsome profits and significant increase in growth (Salojärvi, 2005). Growth is a strategy that basically addresses the question of unsafe and doubtful environments, with the help of attainment of greater

influence over the environment within which the enterprise works. SMEs, knowledge are important factor in failure or success of any firm (Lambe, 2002).

This study aims at exploring the level of KM process and practices adopted by auto component SMEs in Pune region. This study aims to identify and examine the influence of Knowledge management Infrastructure dimensions such as culture, leadership, employee participation, rewarding with incentives and training and mentoring, Information and Communications Technology (ICT) on KM processes which includes knowledge acquisition and creation, knowledge storage and preservation and knowledge sharing specifically in the Auto component manufacturing SMEs industry. The findings of this study will be useful to SMEs, serving as a guideline to discover and to further observe the importance of the above mentioned dimensions and KM processes within an organization in achieving sustainable competitive advantage in SMEs with high value-added growth potential.

1.9 Knowledge Management in Indian SMEs -Auto Component Firms

There is a galore of information available as well as numerous case studies are present on the practice of Knowledge Management within large organizations, but little is known about the advantages of these practices for SMEs. Below are some primary advantages on how SME's can implement KM as an effective tool to reap richer benefits.

Management

Most SME's are promoter driven, and hence the managers in most cases are the owners itself, which imply that decision making is centralized with fewer layers of management. Due to this the decision-making is much shorter than in the case of large organizations. Hence these owners in SME's become the key drivers for knowledge management implementations, assuming of course that they understand the importance of knowledge management. The promoter of SME's also have to look after every aspect of the business and hence it gives them limited time to focus on the strategic issues relating to knowledge management as compared to the senior

management in larger organizations which have the power to delegate some of their responsibilities to their lower level managers, thus freeing their time to focus on knowledge management strategies.

Structure

One of the advantages which SMEs have over large enterprises is the size and structure since they have a simple, flatter and less complex structure. This facilitates a much easier change initiative across the organization since functional integration both horizontally and vertically is easier to achieve with fewer complications which enables them to implement Knowledge Management more effectively. On the other side the advantage larger organizations have over SME's is the level of specialization in their roles, which gives them better expertise in implementing knowledge management but due to their bureaucratic structure which makes them slower and less flexible in creating new initiatives.

Culture

SME's have a more vibrant and dynamic culture which is more organic and fluid in nature and number of people are united under common beliefs and value system. This implies that it easier for SME's to change and implement knowledge management and much easier to create a knowledge sharing culture in such smaller organization as compared to larger organizations. The cultural values and beliefs of the employees are mostly influenced by the promoters / owners and hence it can be a problem if the owner does not trust his employees or does not encourage the culture of sharing and transferring knowledge. In such cases the promoter itself can be a cause of obstructing the development of knowledge which would result in the down fall; hence they have to be very careful about such things.

Human resource

One of the major problems which SME's have is in attracting high caliber, experienced employees as most of the experienced people tend to go to larger organizations, where they get paid higher salaries, perks and bonuses. Furthermore another major problem for SME's to retain, skilled employees, due to the availability

of limited opportunities for career progression, and the constant appeal of larger organizations, which can provide better prospects. Even today SME's are mostly seen by some employee as a stepping-stone to move to larger organization. The departure of such highly knowledgeable and talented workforce is a major threat to SMEs, unless that knowledge is captured, codified, and transferred throughout the organization effectively.

Knowledge Management is a two way communication channel and each of the layers needs to play a much proactive role in the real acquisition of knowledge and implement it throughout the organization. Hence it is very much imperative for SME's to understand the importance of "Knowledge Management" as well as its benefits which include improved competency, efficiency, effective decision making, learning, innovation, and increase in the bottom line.

Organizations are becoming more knowledge intensive, they are hiring minds more than hands and the need for leveraging the value of knowledge are increasing, (Wong, 2005). Managing knowledge in organizations requires managing several processes of knowledge such as creation, storage, sharing and evaluating (Gumus, 2007). Recognizing the value of knowledge is the key to innovative thinking and corporate investment, and is the cornerstone to the long-term survival of manufacturing industries (Singh et al., 2006). The auto component sector in India has emerged as a sunrise sector of Indian manufacturing industry navigating through a period of rapid changes driven by global competition. It has become a key stakeholder in the global automobile manufacturing industry. According to the Auto Component Manufactures Association of India, (ACMA), the Indian auto component industry has been experiencing a high growth rate of 33% over a period and is expected to grow at a Compound Annual Growth Rate (CAGR) of more 17% over the period 2006-14. (NASSCOM Report).

The Indian auto component industry holds a distinctive global competitive advantage in terms of cost and quality. Innovativeness and cost reduction will help manufacturers to meet challenge of increasing demand from developed countries. The Indian auto component industry is very small by global standards and heavily depends

on foreign sources of technology (Singh et al, 2007). Therefore, barring a few, most auto component units can be categorized as Small and Medium Enterprises (SMEs) and are consequently dependent on other companies and institutions for their growth or even survival, (Chaturvedi, 2003). SMEs are often regarded as important innovators in the economy. It is increasingly important for small business to manage their collective intellect (Frey, 2001). Therefore, KM is extremely important for the Indian economy.

1.10 Purpose of the Study

The purpose of study was to find out to what extent Knowledge Management process and practices was being adopted by SMEs. The study tries to identify how the Knowledge Management process and practices is being adopted in the strategic and operational levels of SMEs. It explores to assess to what extent information and communication technology is being used for knowledge acquisition, storage, distribution and preservation. It makes a relationship between KM strategy, KM infrastructure and ICT infrastructure with KM process. It further makes a comparative study of KM between SMEs and large organizations in the auto component sector with respect to the above mentioned dimensions. It also proposes better strategies and implications to the Industry for Knowledge Management practice in SMEs especially auto component firms.

1.11 Chapter Summary

The growth of SMEs in India especially auto component sector has been tremendous in the last decade. This sector has contributed significantly to the GDP of the country. Though these sector focus on the core operations in greater extent, the organizations have many setbacks in terms of facilities and resources. The organizations should concentrate on the intellectual assets and identification and systematic management of these knowledge in a better way to achieve a consistent and a continuous growth in a terms of performance and competitiveness. With this intension the research study has been carried and to explore the better possible KM practices and processes and its implantation to auto component SMEs

Chapter 2

LITERATURE REVIEW

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LITERATURE REVIEW

2.1 Introduction

Over the past ten years, knowledge management has progressed from a prominent topic to an increasingly common function within organizations. Although the need to manage knowledge efficiently is generally accepted, knowledge management is still an intangible concept, and much of the literature continues to explore these intangible issues (Darroch and McNaughton, 2002). Up to now, the effect of knowledge management has not been clearly defined or understood. To develop a sound foundation of the concepts of KM, studies in KM have been explored by the researcher.

This chapter is devoted to a survey of research in the area of KM. This chapter focuses on the Knowledge Management literature review in different areas which includes Knowledge Management perceptions, KM Strategy, Knowledge Management capabilities with respect to competitive advantage, IT, Asian countries, learning organizations, and culture. It also addresses studies pertaining to KM in SMEs, Industry clusters, Automotive Industries – International and Indian Context. The review of literature helped to identify the Research gap which is also discussed in this chapter.

2.2 KM capabilities and competitive advantage

The concept of knowledge management (KM) as a powerful competitive weapon has been strongly emphasized in the literature on strategic management. However, there is a lack of clarity on how sustainable would the competitive advantage provided by KM capability be. With this objective in mind Chuang (2004) developed the concept of KM as an organizational capability and empirically examined the association between KM capabilities and competitive advantage. In order to provide a better presentation of significant relationships the resource-based view of the firm was used. Firm specific KM resources were classified as social KM resources and technical KM

resources. The study concluded that social KM resource had an impact on competitive advantage. However, the findings indicated that technical KM resource was negatively related with competitive advantage. It also concluded that KM capability was significantly related with competitive advantage. The methodology adopted was survey based.

Bordeaux (2009), has addressed key themes across the KM literature which is of interest which are the Value of Knowledge which is treating Knowledge as Asset, Improve Organizational Decision-Making and Improving Group Sense-Making. From an extensive study of literature, he laid down several key insights which serve as initial observations for the establishment of a successful knowledge management regime. These were common data abstraction, protocols and compatible business logic (essential for effective communication across information systems), Process engineering and advanced information/communications technology (to transform organizational structures, establishment of a learning culture. Organizations consisting of characteristics resembling organisms, continuous learning for knowledge workers, Information sharing among trust networks, a culture of sharing and teamwork, Knowledge location—the ability to locate a piece of information or expertise—should be supported by the proper mechanisms.

In the corporate world, the source of energy comes in the form of knowledge and that knowledge is what keeps a business profitable, not its year-end performance. The employees are the knowledge bearers of the company. In company knowledge management systems include elements such as: trust, ethics, incentives, human relations, leadership, culture, organizational infrastructure, social networks, social capital, creativity and innovation, strategy, best practices, human competencies, knowledge sharing proficiencies, and learning.

Literature was reviewed by Michael Truong (2010) to contribute to a better understanding of the knowledge sharing between individuals and business units within an organization. Companies need to find ways to utilize tools within their environment to foster the extraction and storage of knowledge in multiple ways for future reference and use. Organizations should encourage employees to establish

relationships between individuals for its creation, sharing and social use of knowledge. Knowledge is shared informally through formal channels, and much of the process is dependent on the culture of the organization's work environment. It concludes that companies that are investing in their employees and in the technology to harvest their knowledge will be ahead in terms of keeping that intellectual property *in house*. Further, companies should try to keep most of the knowledge that the employees have created in an area easily accessible to everyone, anywhere and anytime.

With the arrival of the new information technologies, the structure of enterprises have changed dramatically, shifting the focus of value creation from tangible based activities to intangible based value creation. The value of intangible assets has therefore constantly increased in the last two decades from an average of 40% of total market value of business corporations to over 80% at the end of the 20th century .In the second half of the twentieth century the value of knowledge was being understood and by the end of the 20th century corporate rules were changed to account for this intangible as physical assets started to become commodities as the value of a company became dependent on its intangible resources. Caddy (undated) said there was a need for a distinction between knowledge management and knowledge measurement. If intangible resources are an asset they must be used to somehow increase the value or worth of the organization. According to Perez and Ordonez de Pablos (2003) tangible assets no longer provide sustainable competitive advantages. As firms are focusing on their intangible assets, intellectual capital can be viewed as the basis for future sustained competitive analysis.

According to Wenger (cited in Chauvel and Despres 2000, p205) knowledge is recognized as a key source of competitive advantage but little is known about how to create and leverage it in practice. Traditional knowledge management approaches attempt to capture knowledge in formal systems but Wenger (cited in Chauvel and Despres 2000, p205) argues we should "*foster the communities that take responsibility for stewarding knowledge*". Zack (2003) comments on a common knowledge misunderstanding whereby the more a company's products or services

have knowledge at their core, the more the organization is, by definition, knowledge-led. Zack (2003) believes this to be a dangerous assumption, both for industrial-age businesses that may believe they *can't* change and for the information-age businesses that complacently believe they don't *need* to change the way they operate.

Berdrow and Lane (2003) examined knowledge management in the context of international joint ventures (IJVs) to depict how to manage the behavioral and contextual considerations with the purpose of creating value for the parent companies. The methodology adopted was case based wherein 20 in-depth interviews were conducted and archival data was collected from eight IJVs within the NAFTA partnership of Canada, U.S.A. and Mexico. The findings culminated into identification of six descriptors. These descriptors are: mindset, controls, strategic integration, training and development, resource contributions and integration, and relationship development. These descriptors help to differentiate between successful and unsuccessful cases.

Knowledge management has become a popular business management discussion topic over the past 5 years. Some of this discussion is no more than hype-generated by software product vendors and consulting houses. However, there is a compelling value proposition holding that the intellectual capital of most organizations can be better managed to create internal efficiencies and external business opportunities. This paper discusses three knowledge management initiatives recently undertaken in the Asia Pacific region that have delivered real business improvements with quantifiable benefits and demonstrable outcomes. Two of these case studies involve major Australian- based financial institutions, while the third relates to a government treasury organization.

Effective knowledge management is emerging as an important concept that enables all the resources of firms, including knowledge, to be used effectively. A knowledge-management is seen as a distinctive capability that supports the creation of sustainable competitive advantages such as innovation. Darroch and Naughton(2003) have in their study identified four clusters of firms based on KM practices. The clusters are

described according to their profile on innovation and financial performance profiles. The study concludes that firms with a knowledge-management orientation outperformed those classified as market-oriented. It also concluded market orientation to be a subset of a knowledge-management orientation. The study was undertaken in New Zealand.

According to Leonard (1998) the starting point for managing knowledge in an organization is an understanding of core capabilities and, for technology based companies, core technological capabilities. Core competences are based on the skills and experience of many people who do the work, and may not exist in physical form (Bollinger and Smith, 2001).

There are many constituent parts to an organization when it comes to embedding knowledge management. Wolf (2000) cites three steps to embedding knowledge management in the organization:

- Determine what kind of knowledge is critical and useful to the business and how it will best support the company strategy
- Identify where this knowledge is to be created, when it is most useful to share it and how this can be done in the context of the organization
- Institutionalize knowledge management processes as an integral part of the organization's business processes

Bhatt (2001) argues knowledge management is more than the capturing, storing and transferring of information and states it "*requires interpretation and organization of information from multiple perspectives*". Bhatt (2002) states knowledge as being more difficult to control than manufacturing activities "*because only part of the knowledge is internalized by the organization, the other part is internalized by the individual*".

2.3 Perspectives of KM

Bray (2007) has review four perspectives based on a survey of literature on knowledge management (KM) at the organizational level. These were- information

systems, management, organizational learning, and strategy perspectives. Each perspective informs the other perspective.

Information system perspective: He developed a framework for analysis of the supporting role of an information system with KM, which were based on four sets of socially enacted, interdependent knowledge processes: they being Knowledge creation, Knowledge sharing (to include storage and retrieval, Knowledge transfer and Knowledge application.

From the management perspective, six issues come to light. They were the concept of knowledge society" and argues that in the future, knowledge will represent the primary resource for individuals and for the economy overall. Second, he considers the balance between automating KM vs. relying on people to share knowledge through more traditional means and concluded that the right strategy depends on the volume of explicit vs. tacit knowledge available within a firm and the value of such knowledge. Third he gave the concept of knowledge sharing wherein he advocated that specialized knowledge should be integrated into the day-to-day routines of highly skilled workers. Fourth, he considered the role of trust in knowledge transfer. His findings reveal that competence- and benevolence-based trust among individuals in an organization influences the link between the tie strength of two individuals and receipt of useful knowledge. Fifth, he discussed the influence of structural diversity on work group performance in a global organization context. The finding is that when members of structurally diverse work groups share knowledge external to the group, their performance improves. In the end he took up collaborative networks and concluded that individuals within an organization (from either the same region or same firm) possess closer collaborative links; thereby influencing a greater probability of knowledge flows.

From an Organizational learning perspective:

Bray advocated that tacit and explicit as two dimensions of knowledge in organizations and suggests that four modes of knowledge creation occurs which are internalization, externalization, combination, or socialization and knowledge moves

from individual, to group, to organizational, to inter-organizational levels via continuous conversations among individuals in an organization.

From a Strategy perspective:

He concludes that knowledge is most strategically valuable resource, firms apply knowledge to the production of goods and services, individuals create and hold knowledge, and firms exist because of the high costs involved with markets attempting to coordinate the knowledge of individual specialists

2.4 ICT and KM

Damodaran and Olphert **(2000)** investigated the use and perceptions of an electronic information management system (EIM) to assess the perceived aims and benefits, current usage, perceived barriers to usage, factors promoting usage, user requirements, and critical success factors of the existing EIM system. The study concluded that despite the commitment of management and belief in the strategic importance of the EIM to the company's aims and success, its acceptance has been slow. The major reasons of slow acceptance were: inadequacies of the technology; lack of user-friendliness of the system; high current workload and absence of spare capacity for new tasks; and failure to institutionalize the EIM. The methodology was a survey of multi-national company.

In the present knowledge society, firms need to develop competitive advantages which are based on intensive use of information and communication technologies (ICTs). ICT has become an essential factor for firm's success and this has greater relevance for small and medium sized enterprises(SMEs) Survival of an SME depends on the use of ICTs to develop new organizational models, compete in new markets or enhance their internal and external communication relationships. This study focused on the impact of the adoption of ICT among SMEs. The study was conducted in stages. In the first stage, an analysis of the current situation of the use of ICT among SMEs was undertaken, the second stage involved studying the objectives and the challenges behind the adoption of ICT, and third stage involved an analysis of

the entrepreneur as well as the innovation orientation as key factors in the ICT adoption process.

The study concluded that there are many benefits of ICT adoption. The major areas where benefit can be seen are: reduction in business costs, improvement in productivity and strengthen growth possibilities, improvement in business cooperation, improvement in business relationships, and also quality and diffusion of knowledge. Hence, SMEs with an innovation philosophy are a powerful strategic tool.

It further suggests that since ICT is not a strategic resource itself, it is free available in the market and is valuable, difficult to imitate and it needs to be ICT must be complementarily exploited along with other business resources in order to get a source of competitive advantage. Therefore, the analysis of the strategic value of ICT must include technological features on one hand but should be adapted to the firm's organizational structure, capabilities, resources, and incentive structure.

Maguire et al studied the SMEs to find out how they are using information and communications technology (ICT) to try and gain a competitive advantage. They conclude that SMEs can gain competitive advantage through the use of ICT as they accept that ICT is helping them in becoming competitive. However, there is great scope for SMEs to gain further advantages by using an integrated and strategic approach in their use of ICT. The research has direct implications for UK SMEs. The sources of information were both secondary and primary data. The secondary data was based on an extensive review of literature and primary data with primary data collected from the various SMEs.

2.5 KM Strategy

There are many KM strategies. Different situations require different KM strategies. Haggie & Kingston (2003), based on existing literature on knowledge management strategies have classified the KM strategies, identified the driving forces for knowledge management and developed a classification tool to link the drivers of KM to the KM strategies. They suggested factors that would influence the selection of a

KM strategy which were current/planned KM strategy, business sector characteristics, a company Strengths, Weaknesses, Opportunities and Threats (SWOT), value focus, organizational structure, organizational culture and the nature of knowledge whether explicit, or tacit. They tested this on a case to depict the usefulness of the model. The company's work practices were investigated by using a questionnaire. They reviewed a number of approaches to knowledge management and depicted that they could be brought together in the six categories of Binney(2001) KM spectrum they being *Transactional KM, Analytical KM, Asset Management KM, Process-based KM, Developmental KM* and *Innovation/creation KM.* They have recommended a seventh category also.

Pablos (2002) in his study investigated the organizational knowledge strategies using the typology of generic knowledge strategies with the objective of performing cluster analysis and classifying firms. Various implications for strategy emerge which were: each firm owns a specific bundle of resources forming organizational capabilities; uniqueness nature is an outcome of different organizational decisions; knowledge strategies determine stocks and flows of organizational knowledge and competitive advantage of firms; decisions involving trade-offs between knowledge exploitation or exploration, internal or external knowledge, breadth of knowledge base, should be made to configure the best strategy. The findings show that organizational performance varies across clusters and knowledge strategy should be integrated among strategic decisions to get good organizational fit.

Swan, Newell, and Robertson (2000) criticized information technology-driven (IT-driven) knowledge management through a discussion of two case studies in which *cognitive and community strategies* were presented. Cognitive strategy emphasizes linear information flow and knowledge that is codified through information technology. Community strategy emphasizes dialogue and knowledge sharing through social networks that include occupational groups and teams. Swan et al.'s (2000) findings provide conclusive evidence that community strategy is more effective in an organization.

2.6 KM in Asian Countries

Many leading organizations in KM practice in Asia are shifting their focus from excellence in operational productivity and quality management to excellence in strategic innovation and learning through KM. With the objective of designing a more systematic, focused program on knowledge management (KM), a survey on the status of KM in nine countries from Asia was undertaken. The methodology adopted was case based wherein 22 cases studies were undertaken. This included firms from the private sector, government, and nongovernmental organizations. The case studies indicated that success in the Asian organizations studied is viewed not only as stemming from intelligent management of knowledge assets but also from supportive relationships and caring leadership that motivate knowledge workers in Asia to perform at their best.

The findings reveal that the extent of adoption of knowledge management (KM) and knowledge-based development (KBD) among the member countries of the Asia Productivity Organization (APO) has been very uneven. Further, the national surveys conducted revealed that some Asian member countries possessed unique or distinctive strengths in KM that could provide the basis for mutually beneficial collaboration and capacity-building. These countries are India, Indonesia, Republic of Korea, Malaysia, Philippines, Singapore, China, Thailand and Vietnam.

2.7 KM and performance

Current performance management thinking recognizes the need to address the management of intellectual capital and the introduction of frameworks such as the Balanced Scorecard (Kaplan and Norton,1996), the Malmquist Productivity Index (Wu, Tsai, Cheng and Lai, 2006) or the Performance Prism (Neely, Adams and Kennerly, 2002) underline the importance of managing the financial and non financial value contributions of intellectual capital. According to Marr, et al (2003) the management of intellectual capital involves:

- Identifying key intellectual capital which drive the strategic performance of the organization
- Visualizing the value creation pathways and transformation of key intellectual

capital

- Measuring performance and in particular the dynamic transformations
- Cultivating key intellectual capital using knowledge management processes
- The internal and external reporting of performance

Lee et al (2005) identifies a new metric that is knowledge management performance index (KMPI), for assessing the performance of a firm in its knowledge management (KM) at a point in time. KMPI which was defined as a function having five components that can be used to determine the knowledge circulation process. These components were: knowledge creation, knowledge accumulation, knowledge sharing, knowledge utilization, and knowledge internalization. KMPI was associated with three financial measures: stock price, price earnings ratio, and R&D expenditure. To assess the contribution of KMPI's for development of knowledge circulation process, information was collected using a questionnaire. The survey covered 101 firms listed on their stock exchange. The study was conducted in Korea and study concluded that when Knowledge Circulation Process (KCP) efficiency increases, KMPI also expanded, enabling firms to become knowledge-intensive. Statistical results showed that the proposed KMPI could represent KCP efficiency, while the three financial performance measures were also useful.

Roy et al (2003) in their study developed a framework to assess the contribution of KM solutions within a business against its corporate objectives. The framework used a set of key performance indicators (KPIs) as lead indicators. The lead indicators were developed in line with the lag indicators at the strategic level. A number of templates were developed to implement the framework within a company. The templates were used to identify KPIs for a manufacturing solution. The paper also gives guidelines on using the templates effectively. A real life case of an engineering company was used.

Intellectual capital is a basic capital for the organization especially SMEs. But this intellectual capital needs to be mobilizing in promoting higher performance which is through innovation and knowledge sharing. Innovation is a resource dependent and based on the development of social system (Pohlmann, 2005) and intellectual capital

is the main source of innovation. While knowledge management is aimed to improve the share and exchange capabilities of organizational knowledge so as to compile an exert wisdoms with collective effort. Therefore the importance of having knowledge management is knowledge to be shared among employee in making knowledge as their precious internal resources. Results based on research of application of intellectual capital (Jin Chen, 2004; Wang & Chang, 2006, Bontis, 2000) found that intellectual capital need a medium to influencing performance which is through innovation and knowledge sharing.

2.8 KM and Learning Organization

As globalization has affected business, many organizations have taken steps to downsize, outsource and deskill in an effort to remain competitive (Hildreth, Kimble and Wright, 2000). Unlike manufacturing activities, knowledge activities are difficult to monitor and control, because only a part of knowledge is internalized by the organization, the other part is internalized by the individual. This duality between individual and organizational knowledge demands different sets of management strategies in knowledge management (Bhatt, 2002).To manage knowledge efficiently a firm needs a highly flexible and adaptable organizational structure. For example Prahalad and Hamel (1990) suggest in present environments, organizations should structure to suit its strengths or 'core competencies', because these kinds of structures are considered "*inherently dynamic and flexible*". There is much debate over whether core capabilities should be defined at the corporate level only or whether a core capability can be located in a division or function within the organization (Leonard, 1998).

Leonard (1998) argued knowledge is directed by the "nudging" of hundreds of daily managerial decisions, and further argues organizations should understand their core capabilities. Core capabilities could constitute a competitive advantage for a firm; they have been built up over time and cannot be easily imitated.

According to Lee and Seok Lin, (2005), "*Individuals, teams and organizations leading and sustaining change need to develop the following three core capabilities*", and cite required core capabilities based on work by Peter Senge. They include:

1. Aspiration. Focus on the creative as opposed to the reactive, developing a clear sense of purpose and vision at both the individual and organization level
2. Generative conversation. Focus on expanding our capacity to be more reflective in our thinking and to become more generative when we think and talk, as to enhance the quality of collective thinking and understanding in the team
3. Dealing with complexity. Focus on internalizing perspectives and skills that allows us to better understand and manage systemic interconnections that produce complex organizational dynamics

Knowledge is an important asset in intellectual capital. But the existence alone does not help the organization without properly utilized it. Therefore, it is important to activate knowledge sharing activity in order to transfer and share tacit knowledge in the organization. Darroch & McNaughton (2002) identified that knowledge sharing can be viewed as an organizational innovation that has the potential to generate new ideas and develop new business opportunities through socialization and learning process of knowledge. Interaction between individuals is essential in the innovation process (Gold et al., 2001). Darroch (1995) suggested that implementing various knowledge management initiatives including knowledge sharing to identify and exploit organizational knowledge is important to organization innovation and organization performance. Knowledge sharing has been identified as positive forces in creating innovative organizations (Yang, 2007).

Knowledge sharing can also be viewed as an organizational innovation that has the potential to generate new ideas and develop new business opportunities through socialization and learning process of knowledge workers (Lin, 2006). Innovative firms develop new products through creating and sharing knowledge (Koskinen, 2005). Besides that, generative innovative ideas rely on knowledge of existing artifacts and practice.

Knowledge sharing has been identified as positive force in creating innovative organizations especially when there are more positive social interaction culture (Connelly & Kelloway, 2003; Yang, 2007). The process of innovation depends heavily on knowledge (Gloet & Terzioski, 2004) therefore knowledge sharing is important in innovation in SMEs. By developing this framework, in terms of perspectives on knowledge centered principles, knowledge sharing infrastructures and knowledge based initiatives; the objective is to focus on how organizations could better fulfill their roles in these strategic areas. The role of information technology, even though vary depending on resource constraints, in knowledge sharing process is important especially to promote a flourish of innovations.

Gieskes, Hyland and Magnusson (2002) argued productivity would increase given a working environment conducive to getting the most out of a diverse resource pool. Wenger (2004) promotes communities of practice as a way of engaging the "practitioner" stating communities of practice relate to groups of people who share a passion for something that they know how to do, and who interact regularly in order to learn how to do it better. Communities of practice are the shop floor of human capital according to Stewart (1996).

In some organizations, the communities themselves are becoming recognized as valuable organizational assets. Whereas the value was previously seen as being relevant primarily to the individual members of a community, it is often now recognized that benefits can also accrue to the organization itself (Lesser and Storck, 2001). According to Wenger (2004) communities of practice manage their knowledge. "*If you had enough knowledge to micro-manage communities of practice you would not need them*". According to Hildreth, Kimble and Wright (2000) in order to work effectively in a distributed international environment, companies are increasingly turning to the international team. These are seen as an effective and flexible means of bringing both skills and expertise to specific problems and tasks.

Yoopetch(2010) undertook a study to test a model of knowledge acquisition. It focused on the Small and Medium Enterprises (SMEs) in the hospitality industry. The

study was carried on in Thailand. Four factors of knowledge acquisition were identified. They were information technology support, team working, social network and internal communication. The study concluded that to achieve greater success in knowledge acquisition activities, organizations have to focus on the effectiveness of these factors. The role that social network and team working played had a higher impact on knowledge acquisition of the organization. He recommended that organizations should therefore focus more on these factors to improve the long-term performance of managing organizational knowledge.

2.9 Culture and KM

According to Drucker (2003) there is no such thing as the one right organization. There are only organizations, each of which has distinct strengths, distinct limitations and specific organizations. Newell, Robertson, Scarbrough and Swan (2002) state shared values and attitudes shape organizational behavior.

According to the National Defence University (undated) there is no single definition for organizational culture. Berg and Wilderom (2004) defined organizational culture as shared perceptions of organizational work practices within organizational units that may differ from other organizational areas. Alavi, Kayworth and Leidner (2005) found individual communities' perception of knowledge management technology is shaped by their embedded values which lead to different patterns of technology use.

Nonaka and Takeuchi(1995) present a case for knowledge management practices by detailing how Japanese companies leverage their organizational knowledge into a competitive advantage. Nonaka and Takeuchi(1995) focus their work on how organizations create knowledge and the importance of organizational culture in knowledge creation. The authors dedicate much of their work on defining two types of knowledge—tacit and explicit. The authors posit that tacit knowledge is the most valuable of the two because it is knowledge that is learned by experience and that leads to innovation and sustainable competitive advantage. Explicit knowledge, on the other hand, is procedural knowledge that is contained in manuals, protocols, and procedures. Because tacit knowledge is communicated indirectly through human

interaction, Nonaka and Takeuchi emphasize the importance of organizational culture in determining whether or not the exchange and communication of tacit knowledge will occur. The authors support their theory of knowledge creation and exchange with case studies from more than 15 organizations.

Davenport and Prusak(2000) trace the development of knowledge management and link it to business strategy, work processes, culture, and behavior. Importantly, the authors demonstrate the move away from technology-driven solutions in knowledge management toward the focus on human interaction within organizations to stimulate knowledge flow. The authors underscore the importance of linking cultural and organizational factors to the implementation and sustainability of knowledge management initiatives. The authors provide not only conceptual frameworks for knowledge management, but also examples of implementation in 39 organizations throughout the world. The authors underscore the importance of linking theoretical frameworks of knowledge management with the application of knowledge management initiatives in the business environment.

De Long and Fahey(2000) posit that organizational culture is a major barrier to leveraging intellectual assets. The authors focus on four ways in which culture influences organizational behaviors central to knowledge creation, sharing, and use. The first is the shared assumptions about what knowledge is and which knowledge is worth managing. Second is the relationship between individual and organizational knowledge. Third is the context for social interaction that determines how knowledge will be used in particular situations. Fourth is the process by which knowledge is created, legitimated, and distributed in organizations. The authors conducted research in more than 50 organizations that have implemented knowledge management initiatives to discover that most managers have recognized organizational culture as the major barrier to creating and leveraging knowledge assets. For this study, De Long and Fahey investigated how 24 organizations initiated and managed knowledge-related projects, and interviewed 12 chief knowledge officers across a range of manufacturing and service organizations. The authors conducted a systematic and detailed review of knowledge management literature to identify a small number of case studies of organizations identified as exemplars in the practice of knowledge

management. The authors also had access to a less formal, but significant source of anecdotes, vignettes, and insights into the relationship between culture and knowledge from the many executive education programs they have conducted, as well as from a series of knowledge management corporate consortium meetings sponsored by Ernst & Young's Center for Business Innovation. They set out to demonstrate the importance of culture on many of the issues central to effective knowledge management and to explore the four ways in which organizational culture shapes knowledge creation, sharing, and use. The authors propose diagnostic action steps that managers can take to assess the fit between their organization's existing culture and desired behaviors related to effective knowledge management.
This is particularly important when senior executives of small or not-for-profit organizations look for affordable ways to implement and sustain a knowledge management initiative.

Rastogi, Prabandh, N. (2000).examines processes that are fundamental to effective knowledge management initiatives. The author defines knowledge management as a systematic and integrative process of coordinating organization-wide activities of acquiring, creating, storing, sharing, diffusing, developing, and deploying knowledge by individuals and groups in pursuit of major organizational goals. Rastogi supports the importance of organizational culture in knowledge management by positing that knowledge management cannot be accomplished in the absence of a social environment that is built on trust, cooperation, sincerity, goodwill, help and care, shared values and vision. The author presents eight operational requirements of knowledge management initiatives and examines organizational structures that support knowledge management. He presents a list of problems and difficulties in implementing knowledge management initiatives, and also details action imperatives for knowledge management. This study presents a theoretical framework for knowledge management initiatives.

2.10 Studies on KM in SME

Salojarvi et al(2005) undertook a study with the objective of finding that impact of knowledge management on the financial success of companies. He focused on

examining the relationship between sustainable sales growth and knowledge management activities. They conclude that KM is correlated to company's growth and higher levels of KM-maturity were found to correlate positively with long-term sustainable growth. Although the SMEs did display a high awareness about KM, only a small number of the sample firms have been able to benefit in terms of growth from their KM-related activities. They found that the fast-growing companies with high KM-maturity are applying KM-related activities in a comprehensive and balanced way, thereby raising question marks around the effectiveness of eclectic "KM implementations". The study was survey based wherein data was collected with the use of a questionnaire and supplemented by interview. The study was on 108 Finnish small and medium-sized enterprises (SMEs).

Thorpe et al (2005) undertook a systematic review of the literature on how small and medium-sized enterprises (SMEs) use and acquire knowledge. The review was undertaken as part of the Economic and Social Research Council's Evolution of Business Knowledge Programme. They concluded that SME knowledge research concentrates primarily on the acquisition and use of knowledge, treating it as an asset that is transferred by routines and these refer to three main areas. First, on the influence and abilities of the entrepreneur to extract, use and develop knowledge resources, secondly, on firm-wide systems and the social capital that facilitates knowledge exploration and exploitation and thirdly, on the provision of knowledge and learning experiences through government policy. Further they also concluded that policies encouraging entrepreneurship and economic regeneration need to be more flexible and sensitive to the often complex contexts within which knowledge is used by SMEs.

Apurva Anand (2011) in her study has reviewed existing literature on KM. She has discussed various approaches to KM process such as those given by Dagnfous & Kah(2006), Lee et.al.(2005), Wong & Aspinwall (2004), Bukowitz & Williams (2003), Mc Elory (1999), Meyer & Zack (1996), and Wiig (1993). Based on the review, he has identified the major stages as Knowledge capture and creation, Knowledge organization and retention, Knowledge dissemination and Knowledge

utilization. It also concluded that the major benefits that can be achieved through implementing knowledge management is to deal with issues like products and processes complexity, increased relevant knowledge base both technical and non-technical, shorter product life cycles, and increased focus on the core competencies. It also concluded that KM is tool which would help us utilize our resources in a smarter and efficient way to achieve higher business goals in a productive way and its aim was to develop new opportunities, creating value, obtain competitive advantages and improve performance to attain the organizations objectives and emerging needs.

Rehman et al (2010) advocates that Knowledge Management is not only important for business organizations but have significance for every country. This is basically because every country has experienced a gradual shift from industrial to knowledge base economy and are making best use of knowledge they possesses in order to get and maintain comparative and/or absolute advantage. This research focuses on the implementation of Knowledge Management in Small and Medium Enterprises of two countries- Pakistan and Malaysia.

The study proposed a framework for identifying CSFs in implementing KM in Small and Medium Enterprises (SMEs). The framework identified 14 variables to assess their impact on the implementation of KM in SMEs. These were an understanding of KM, Top Management support, culture, IT infrastructure, communication at all levels of management, training and education of employees, hiring and retaining of knowledgeable employees, rewards to encourage KM practices, measuring effectiveness of KM, organizational infrastructure, strategy for KM implementation, core values of a business, systematic KM processes and activities. Further, impact of KM implementation on 'daily performance of an organization' and 'financial performance of an organization' was also assessed. The study concluded that all these factors have positive impact on implementation of KM except communication at all levels of management and core values of the business. It also concluded that implementation of KM had a significant and positive relationship with non-financial performance of company and has no significant relationship with financial performance of company. The methodology adopted involved survey using questionnaire administered to 60 SMEs in Malaysia and Pakistan.

Zhang (2005) contends that managing knowledge is critical not only for large organizations but also for Small and Medium sized Tourism Enterprises (SMTEs) where limited resources and the lack of the strategic direction are prevalent. A review of literature suggests SMTEs are less ready for implementing knowledge management projects than are large organizations and they are in need of practical strategic guidance if they are to make the most of the under-exploited, knowledge within the organization and available to their organizations. Their study proposed a strategy with the objective of harnessing explicit knowledge and strategic activities based on an extensive analysis of the literature. The proposed strategy contains actionable steps with timelines and milestones that can be implemented and modified iteratively by SMTEs, with in-built assessment and measurement mechanisms. The finds of the study reveal that implementation itself can be flexible as well as iterative with no need for all the steps outlined for an improvement of the knowledge management process to be followed.

McAdam & Reid (2001), compared the perceptions of both large organizations and small- to medium-sized enterprises (SMEs) at a meta level in regard to knowledge management (KM) to improve overall understanding and synthesis of the philosophy and to develop sector-specific learning in the SME sector. Firstly it identified and described the key dimensions of KM using a socially constructed KM model. Secondly it used a survey of large (> 250 employees) and SME (< 250 employees) organizations to investigate the perceptions of the KM dimensions. Thirdly, it reviewed a series of qualitative social constructionist workshops, involving both large and SME organizations which were run to gain a deeper insight into the sector comparisons. The results indicated that KM is understandable and implementation is developing in the large organization sector and knowledge is recognized as having both scientific and social elements. However, the SME sector was less advanced with a mechanistic approach to knowledge and a lack of investment in KM approaches and systems.

Quaddus and Xu (2007) in their study investigated into the practice and use of KM between small and medium enterprises (SMEs) and large organizations. The findings indicate that "Competitive Pressure", "Customer Demand and Expectation", "Top Management Support/Leadership", "Organizational Structure", "Organizational culture", and "Benefits to individuals" are the significant factors of knowledge management and there are no significant differences between the SMEs and large organizations on KM factors. The findings indicate that "organizational size" does not have any effect on the 'initiation' and 'use behavior' of KMS. Such finding is not in line with many past IT adoption study as traditional literature on Information Systems which generally reports that size does matter in IS adoption. A possible explanation is that the competitive pressure has forced every business and organization practice knowledge management even though there are some differences in format, extent, complexity, advances, and experience of their knowledge management activities. The methodology adopted was a qualitative filed study undertaken by collecting data via interviews of five large organizations and ten SMEs.

2.11 KM in Industry Cluster

The concept of industry cluster was popularized by Porter in 1990. Ever since, many countries tried to improve the competitiveness of through industry sector. Not only companies who take part in the cluster but also academic institutes, government agencies, associations, and supportive industries. Chakpitak et al(2006) contend that the more actors involved in the cluster the more knowledge were distributed among the member of cluster. They elaborate that though many literatures about cluster explained how knowledge is important for the cluster development, there is no specific knowledge management methodology or system for the cluster. They undertook a study with the objective of finding out how knowledge is exchanged in the cluster by using knowledge engineering methodology to analyze, model and design Knowledge Management System (KMS).

At the end of the study they implement KMS in handicraft cluster in Thailand as our case study. They result was that they concluded on the specification of the sharable knowledge/information and the conditions of sharing among the cluster members.

This knowledge was captured and maintained the knowledge (for reusing when required) and then worked on the specific infrastructure to enhance the collaboration. At the end they developed the knowledge management system for the handicraft cluster regarding to acquire requirements specification from the cluster.

2.12 KM in Automotive Industries – International Context

DeSouza and Awaza (2006) contend that managing knowledge is a critical capability for small to medium-sized enterprises (SMEs) to master as it enables them to leverage their most critical resource. He further states that organizational knowledge is the most salient resource at the disposal of SMEs in terms of availability, access, and depth and successful SMEs leverage their knowledge in an effective and efficient manner and make up for deficiencies in traditional resources, like land, labor, and capital. Though their study they identified and discussed five peculiarities about knowledge management practices at SMEs. They concluded that SMEs do not manage knowledge in the same manner as larger organizations and to view SME knowledge management practices as scaled down versions of the practices found in larger organizations was not a correct approach. SMEs have understandable resource constraints, and hence have to be creative in working around these limitations in order to manage knowledge. The methodology adopted was a study of KM practices of SMEs.

Corso et al (2004) studied the SMEs and state that to survive in the global economy small and medium enterprises (SMEs) have to improve their products and processes exploiting their intellectual capital in a dynamic network of knowledge-intensive relations inside and outside their borders. Information and Communication Technologies (ICT) provide SMEs with opportunities for Knowledge Management (KM) which remains unexplored. They focused on the area of Product Innovation (PI) and drew evidence from the analysis of a multiple-case study on 47 Italian SMEs to depict patterns in the adoption and use of new ICT tools. They this explained in relation both to Contingencies and to KM internal processes. They conclude that complexity at both product and system levels, emerges as a key factor driving technological choices.

Chauvel and Depress (2000) contend that a competent analysis of survey research in any domain opens a window on the thinking that the field has on itself. They analyze the survey on KM conducted between the period to identify the themes that form their conceptual foundations, and determines the broad areas that appear to be major and minor preoccupations in KM. On the basis of this, they developed a framework of six bipolar dimensions that account for all the organizing logics employed in the group of surveys. This framework was compared against previous research in which Despres and Chauvel identified the structuring devices used in conceptual models of KM. They concluded their study by making projections for future thinking in KM given the view it appears to be taking on itself.

Ongori and Migiro(2009) undertook a study with the objective of identifying the driving forces, challenges benefits, barriers and strategies to decrease barriers to information and communication technologies (ICTs) adoption and assimilation by small- and medium-sized enterprises (SMEs). The study was based on secondary data as reviewed the existing literature both online and print. Their study concluded that ICTs adoption and assimilation in SMEs is critical to enhance their competitiveness. In addition, ICTs usage in SMEs will enhance accessibility into the international markets.

The study has implications for the industry as effective use of ICTs in SMEs has great impact on its competitiveness and sustainability. Further owners (who are often owner managers), strategists and other stakeholders would also be in a position to understand the challenges faced by SMEs in ICTs adoption and come up with various interventions in time to assist SMEs.

Nunes et al(2006) undertook a study of SMEs with the objective of getting an understanding of KM and its usage in small and medium knowledge-intensive enterprises. They concluded that while SMEs acknowledge that adequately capturing, storing, sharing and disseminating knowledge can lead to greater innovation and productivity, they are not willing to invest on long term knowledge management goals because it is difficult for them to assess value made by it. Therefore often KM

activities within SME take place in an informal way; they are rarely supported by purposely and formally designed ICT systems. The study was case based. It included study of SMEs in South Yorkshire (England). The case studies were analyzed using qualitative research methodology, composed of interviews and concept mapping. The study further suggests that in order to implement KM in SMEs the cultural, behavioral and organizational issues need to be tackled first before considering technical issues.

Bozbura (2007) undertook a study with the objective of assessing the senior managers' perceptions about the extent to which the components of KM contribute to the success of SMEs (small and medium enterprises). He concluded that SMEs do not like to share knowledge even within the company as the manager is afraid of losing the control of knowledge. Since the information channels are closed, the incoming knowledge also does not take place.

The study was undertaken in Turkey based on a survey of SMEs in Turkey.

In order to have an extensive study on Knowledge Management, various cases of KM practices at Multinational Auto motive Industries have been studied. The cases describe the different practical strategies and initiatives taken by the automotive giants which could be taken as an benchmark to get a clear understanding of how better KM implementation can be done in various SMEs.

In the automotive industry, Rethink IT (2004) highlights Audi's KM attempts that make use of packaged content management solutions. This has provided for the storage of all forms of expert knowledge and research information, and allows employees to form communities and workgroups for sharing knowledge (Rethink IT, 2004).

(Beers, Davenport and DeLong, 1997) reported on an anonymous automotive manufacturer who successfully implemented and made use of a repository of engineering and design knowledge as a KM initiative. They also report on another

automotive manufacturer who made use of a repository of competitive intelligence (Beers, et al., 1997). This competitive intelligence was comprised of analysis of their competitor's performance and operations (Beers, et al., 1997) to assist in decision-making.

(Burnes and West, 2000) provide details of automotive organizations that have undertaken some form of KM practice. The Rover Group embarked on an ambitious project to promote a learning culture (Burnes and West, 2000). Volvo, on the other hand, has already established a learning culture and are promoting the creation and use of knowledge and other skills (Burnes and West, 2000). Even Jaguar has made use of knowledge-based engineering efforts to realize savings and time reductions (Kochan, 1999).

Davenport and Völpel (2001) recognize that many organizations have implemented some form of Knowledge Management (KM) initiative, and thus it is not surprising that many automotive manufacturers have followed suit. Most automotive Original Equipment Manufacturers (OEMs) have made some attempt at KM initiatives, and these attempts have been well-documented. Among the automotive component suppliers, however, little evidence exists of attempts at KM, and for this reason the author focuses this chapter on those initiatives implemented in automotive OEMs as a basis for how component suppliers should establish KM practices. The automotive OEMs have managed to establish KM practices worldwide. The author relates efforts made by BMW, DaimlerChrysler, Ford, General Motors, Toyota and Volkswagen to create value from KM initiatives.

At BMW, the goal of the KM initiatives includes: the establishment of subject-specific knowledge bases; access to information worldwide; reduction of time to access knowledge; and the collection of know-how from projects in a central repository (Kappe, 2001). For this reason the *"BMW Knowledge Center"* was established. The features of the knowledge centre include: web-based document management; access to documentation and information; easy to use; secure; and advanced search capabilities (Kappe, 2001). This knowledge centre also dynamically

creates a *"yellow pages"* directory to connect experts to a problem area (Kappe, 2001).

The key reason for DaimlerChrysler's KM initiatives is to ensure that skilled workers communicate to create, store and share know-how (Coughlan and Rukstad, 2001). This is particularly important given the nature of the organization today, and the need to accumulate knowledge sources from all subsidiaries of the multinational company.

Before the merger of Chrysler and Daimler-Benz, the KM efforts at the two organizations differed remarkably. For Chrysler, their financial situation in the early 1990's drew considerable attention to the state of their KM practices (Coughlan and Rukstad, 2001). These financial troubles led to the closure of certain manufacturing facilities and the consequential retrenchment of a substantial portion of the organisation's workforce, including numerous engineers (Coughlan and Rukstad, 2001). Coughlan and Rukstad (2001) view these lay-offs as responsible for the shortage of knowledge resources, and the resultant design flaws in subsequent Chrysler automobiles. Consequently, Chrysler embarked on a three step solution to this problem.

First, knowledge resources were mapped out (Coughlan and Rukstad, 2001). Second, specialized Communities of Practice (CoPs), which are often referred to as *"Tech Clubs"*, were formed to ensure collaboration between engineers that are working on similar problems (Coughlan and Rukstad, 2001). The third step involved the creation of the *"Engineering Book of Knowledge" (EBoK)* which was intended to store knowledge created by the CoPs (Coughlan and Rukstad, 2001). Galletta and Malhotra (2003) report on the responsibilities of the *"Tech Clubs"* to ensure the validity of the contents of the *EBoK*. Prior to the merger, Daimler-Benz was not facing the same financial problems as Chrysler and their staff turnover remained low (Coughlan and Rukstad, 2001). Coughlan and Rukstad (2001) believe that the German tradition of vocational training of skilled workers ensured that tacit knowledge continued to flow within the organization. However, importantly, Daimler-Benz had not formalized a KM program prior to the merger with Chrysler (Coughlan and Rukstad, 2001).

One formal attempt by Daimler-Benz at KM that proved ineffective involved external consultants creating a database of lessons learned and related reports (Coughlan and Rukstad, 2001). Coughlan and Rukstad (2001) reports that this approach was not successful due to the external consultant's inability to determine the relevance of knowledge resources for Daimler-Benz employees. Consequently, it was determined that these knowledge resources should be collected by the workers for whom it is intended (Coughlan and Rukstad, 2001).

The merger of Daimler-Benz and Chrysler in June 1998 created the fifth largest automaker globally (Coughlan and Rukstad, 2001). Early on it was recognized that the newly formed DaimlerChrysler needed to embrace KM to realize the full benefit of the merger. The benefits of a KM program were intended to enable DaimlerChrysler to maintain technological skills, reduce product development times and establish new product markets (Coughlan and Rukstad, 2001).

Chrysler staffs were already sensitive to the need for KM; however Daimler-Benz employees were relatively unaware of the potential benefits for the company. This awareness was created through the Post Merger Integration (PMI) program, which included projects to demonstrate how staff at both companies could learn from each other (Coughlan and Rukstad, 2001). The PMI involved management from both Daimler-Benz and Chrysler working in teams to handle issues under separate areas (Coughlan and Rukstad, 2001).

As the new organization evolved, the CoPs drew attention to the need for a formal KM strategy. Consequently, DaimlerChrysler surveyed the organization to identify knowledge areas that had developed in isolation from the company, and to ensure these areas were supported by the relevant CoPs (Coughlan and Rukstad, 2001).

Two unique features of Ford's KM initiatives include: a methodology to calculate the monetary value of savings from KM; and a link to an Internet strategy for serving customers and suppliers (Coughlan and Rukstad, 2001). Ford's organizational culture

emphasizes learning as the basis for future growth, and includes a 40-step process for best practice assimilation (Coughlan and Rukstad, 2001). The importance of Ford's knowledge base is highlighted by the estimated 22 000 queries it handles on a daily basis (Coughlan and Rukstad, 2001). Coughlan and Rukstad (2001) report that Ford views all KM activities as an integral component of daily work however do not formally acknowledge or reward employees for participation.

Rethink IT (2004) report on Ford's use of intranet sites and portals which focus on forming relationships between the relevant people to allow collaboration to occur (Rethink IT, 2004). Additionally, Ford has provided templates and job aids so that engineers can make use of pre existing knowledge resources, however they recognize that it is not possible to force these engineers to make use of such tools (Davenport, 2002).

(MacInnis, 2005) is vague on the extent to which General Motors have embarked on a KM initiative. (MacInnis, 2005) reports that General Motors began considering KM after an employee's retirement (and the exodus of that employee's knowledge) required a recall of $ 25 million worth of paint. This alerted General Motors to the potential losses it faced whenever an employee left the company (MacInnis, 2005). General Motors' plan to evolve into a learning organization included the establishment of the *"General Motors University"* (Coughlan and Rukstad, 2001). Coughlan and Rukstad (2001) note that General Motors effectively established centers of excellence that each focused on a particular area. Furthermore, managers were encouraged to document decisions made and to discuss best practices on the company's intranet (Coughlan and Rukstad, 2001).

Toyota is widely recognized for its KM initiatives. (Michailova and Nielsen, 2006) recognize its ability to make use of knowledge from within its own company and its suppliers. Liker (2004) highlights Toyota's use of a know-how database to keep track of ideas that have been either successful or unsuccessful in previous attempts. These KM initiatives can be viewed as the reason for Toyota's past, and continued, success and domination in the global automotive industry. Toyota has been recognized as a

leader in KM efforts as a three time winner of the Global Most Admired Knowledge Enterprises (MAKE) awards and five times winner of the Japanese MAKE awards (International Center for Management Research (ICMR), 2005). Toyota's KM efforts are not separate implementations, but are rather embedded in everyday practices and the organization's culture (ICMR, 2005).

Despite Toyota's success, their KM efforts remain largely undocumented. In fact, perhaps the most powerful statement regarding Toyota's KM initiatives was made by Rory Chase (2005 in ICMR, 2005, p.1):
"Toyota does not have a separate Knowledge Management philosophy and strategy; managing and sharing knowledge are a part of everyday life at Toyota."

Toyota's formal attempts at KM included the *"Toyota University"* and a central repository of information (Coughlan and Rukstad, 2001). Coughlan and Rukstad (2001) note that the successes of Toyota's KM initiatives are largely due to the personal contact that is encouraged within the organization. Additionally, Johnston (2001) discusses the emphasis placed on employee's actions as a problem solver at Toyota. Employees learn how to identify a problem, conduct a root-cause analysis and develop a suitable counter-measure (Johnston, 2001).

Cleveland (2007) reports on the considerations of the Toyota Product Development System relating to KM. This system ensures KM is provided for by: providing templates for storage of engineering data, sharing the data with involved parties, and ensuring all engineers on a project are equally informed (Cleveland, 2007).

Volkswagen has implemented the information platform to enable customer care consultants to access the organization's knowledge database (Hyperwave, 2007). The information contained in this database is kept relevant and up-to-date and allows the consultants to answer questions relating to the numerous vehicle models, car dealers and delivery dates (Hyperwave, 2007). Volkswagen values their employees' experience and recognizes it as the most important intellectual asset of the organization (Volkswagen, 2007). The focus of Volkswagen's KM efforts is to make

knowledge available to all employees and to distribute solutions to problems throughout the organization (Volkswagen, 2007).

Volkswagen has successfully implemented a *"yellow pages"* application that acts as an expert finder within the organization (Volkswagen, 2007). This allows employees to find the right expert in a given situation, together with relevant information relating to the situation (Volkswagen, 2007). Furthermore, Volkswagen has implemented expert rooms to facilitate collaboration between employees in delocalized networks (Volkswagen, 2007). This ensures that decisions can be made quicker with more certainty (Volkswagen, 2007). Furthermore, the Volkswagen knowledge base provides information in a number of subject areas, and is structured so that the relevant information can be easily located (Volkswagen, 2007).

The cases were with respective to automotive giants especially original equipment manufacturers effectively practicing knowledge management. These studies give make clarity in understanding the relevance the best practice that could be implanted in SMEs.

2.13 KM in Automotive Industries – Indian Cluster

New knowledge creation has gained currency in the global knowledge economy. It is important not only for big firms, but for small and medium size enterprises (SMEs) also. Indian automotive components sector is one of the fastest growing sectors of Indian economy and is dominated by SMEs. Pillania in this study focused on SMEs with the aim of studying the knowledge creation and categorization in SMEs in Indian automotive components sector. It concluded that among various kinds of knowledge, knowledge about customers is given most importance. Though new knowledge creation is gaining importance, research and development spending as percentage of turnover are very low. He compared Indian SMEs with international SMEs and found that international automotive components manufacturers have a better perception about knowledge creation compared to the prevalent view in Indian firms. Further, in terms of relevance, latest and timeliness, Indian and international automotive components manufacturers pay little credence to the knowledge available through

government institutions and industry associations. Therefore, industry associations and governments need to have a re-appraisal of their practices and make their working more useful, fast and updated. Pillania's study has policy implications for government and industry associations. He has suggested corrective measures for industry associations and government bodies for contributing to knowledge creation and implementing knowledge management in organizations.

(Rajesh K Pillania, 2008) The global automobile industry is facing a lot of challenges in the changing scenario -. There are number of new issues facing the firms and original equipment manufacturers are transferring many of the responsibilities to the suppliers. Knowledge management is widely accepted as a source of competitiveness. Increasing environmental standards and safety concerns, and the search for alternative fuel technology, are putting a further premium on knowledge creation and knowledge management. The knowledge management requirements and its implementation for small firms are different from that for large firms. The Indian auto component industry, which is dominated by small and medium firms, has been performing quite well over the last decade. This paper studies the state of knowledge management in the Indian auto component sector.

Knowledge management (KM) research has focused more on large firms. Lately, there is increasing realization of need and significance of KM for sustainable competitiveness for small and medium-sized enterprises (SMEs) (Rajesh K. Pillania, 2008). Potential competitive advantage of KM may be more profound in a small firm. Information Technology (IT) has a crucial role in KM. IT is the facilitator, the enabler. The IT requirements of SMEs are different from that of big firms. Most of the research on role of IT in KM has focused on big firms. The purpose of this research paper is to look at IT for KM in SMEs particularly, in Indian context. IT tools are more in use in international auto components manufacturers (ACMs) as compared to Indian ACMs. The major problems faced by ACM vary among international and Indian ACMs. Internet is used by every organization under study followed by intranet. IT has just grown over time in the organizations under study.

A well developed and aligned knowledge management strategy and active top management participation are two of the key strategic issues in knowledge management (Rajesh K. Pillania, 2008). The studies on knowledge management strategy and role of top management have mainly focused on big firms. The basic requirements and resources of SMEs are different from big firms and consequently knowledge management practices are different in SMEs as compared to big firms, and that requires a thorough study of various aspects of knowledge management for SMEs. This research work is an attempt to study strategic issues in knowledge management in SMEs in India, with particular reference to the automotive component sector. Customer focused knowledge is the most common knowledge management strategy among Indian auto com ponent manufacturers. Top management is more active and supportive in knowledge management initiatives in international auto component manufacturers. Indian SMEs need to focus more on the strategic issues in knowledge management for reaping the benefits of knowledge management for sustainable competitiveness.

New knowledge creation has gained currency in global knowledge economy. It is important not only for big firms, but for small and medium size enterprises (SMEs) also. Indian automotive components sector is one of the fastest growing sectors of Indian economy and is dominated by SMEs (Rajesh K. Pillania, 2008). This research work aims to study the knowledge creation and categorization in SMEs in Indian automotive components sector. The findings show that among various kinds of knowledge, knowledge about customers is given most importance. Though new knowledge creation is gaining importance, Research and Development spending as percentage of turnover are very low. International automotive components manufacturers have a better perception in knowledge creation compared to prevalent view in Indian firms. This gives the guidelines for knowledge creation and categorization in SMEs.

2.14 Framework or Models of Knowledge Management

This section presents various studies which have developed the framework to be tested. The brief details of the study and the findings are explained:

Gold, Malhotra, and Segars (2001) proposed a knowledge management effectiveness model based on combining organizational capability perspective theory and contingency perspective theory. The structural equation model defined knowledge effectiveness in terms of two main constructs, *Knowledge Infrastructure capability* (knowledge management enablers) and *knowledge process capability.* Knowledge Infrastructure capability represents social capital, the relationships between knowledge sources and users, and is operational by technology, structure, and culture. Knowledge process capability represents the integration of knowledge processes into the organization, and is operational by acquisition, (the capturing of knowledge), conversion (making captured knowledge available), application (degree to which knowledge is useful), and protection (security of the knowledge).

The study concluded that the paths between *infrastructure and process capabilities and the performance variable were positive and of high magnitude.* These results seemed to underscore the importance of tightly aligned process and infrastructure capabilities in creating conditions favorable for a company's success. This research presents strong evidence regarding the impact of knowledge management capabilities on knowledge effectiveness. The methodology was a survey based where a structured questionnaire having seven point likert scale is used to collect structured information

Keskin (2005) undertook research to study the relationship between knowledge management strategy and firm performance with the help of a theoretical model. He classified knowledge management strategies into two categories, explicit-oriented knowledge management strategy and tacit-oriented management strategy. Further, firm performance compared to key competitors was classified into six components: success, market share, growth, profitability, innovation, and size. His study was based on the assumption that management strategies positively affect firm performance and both environmental hostility and intensity of market competition further impact the

relationship between explicit-oriented and tacit-oriented knowledge management strategies and firm performance.

The study concluded that both explicit and tacit knowledge strategies were significant positive explanatory variables of a company's performance and the impact of explicit-oriented knowledge strategy was higher than the tacit-oriented strategy on a company's performance. It further concluded that there is a stronger relationship between a company's performance and knowledge management strategies when environmental turbulence and intensity of market competition are greater.

Horak(2001) in his study identified ten human factors which would affect the implementation of KM initiatives which were fear, cultural change, capturing of tacit knowledge, ease of use, stakeholder involvement and benefits realization. His study concluded that with these factors, a phased change management approach could be adopted which consisted of an assessment, strategic planning, organization development, system systems design, orientation and training, team building and continuous evaluation and improvement.

Wong (2005) undertook research with the objective of the critical success factors (CSFs) for adopting knowledge management (KM) in small and medium-sized enterprises (SMEs). The methodology adopted was survey based where in a questionnaire was developed and administered on SMEs in UK. The study concluded with 11 factors (CSF) and a priority list of these factors were also generated. The methodology adopted was survey where in a questionnaire was developed and administered to SMEs in UK. This study could be a source of information to SMEs which lags behind in adopting KM practices.

Lee and Choi (2003) examined the relationship among knowledge management enablers, processes, and organizational performance. The study included four enablers: culture, structure, people, and information technology and emphasized knowledge creation processes including socialization, externalization, combination, and internalization. To establish credibility between knowledge creation and

performance, organizational creativity was incorporated into the model. The study concluded that the organizational culture variable is essential for knowledge creation. People and structure variables do not significantly affect knowledge creation. The information technology variable is the only significant variable related to the combination variable of knowledge creation. Further, knowledge creation is positively related with organizational creativity, which is positively related to organizational performance. These findings confirm that organizations can achieve the strategic benefits of knowledge management through effective knowledge management enablers and knowledge creation.

Mohamed Khalifa and Vanessa Liu (2003) investigated and identify the main determinants of successful knowledge management (KM) programs. Institutional theory and the theory of technology assimilation was drawn to develop an Integrative model of KM success that clarifies the role of information technology (IT) in relation to other important *KM infrastructural capabilities* and to KM process capabilities. The research model was tested with a survey study involving 191 KM practitioners. The empirical results provided strong support for the model. In addition to its theoretical contributions, this study also presents important practical implications through the identification of specific infrastructural capabilities leading to KM success.

Park (2006) examined the link among knowledge management enablers (infrastructure capability), knowledge management process capability, and knowledge management performance. The model provided a clear framework and construct about knowledge management enablers, knowledge management process capability, and knowledge management performance. He classified knowledge management enablers are classified into three categories, organizational culture, technology, and structure. Knowledge management process capability was classified into four components, knowledge acquisition, knowledge conversion, knowledge application, and knowledge protection. There were two dimensions of knowledge management performance focus: knowledge management effectiveness and knowledge management satisfaction.

Findings of this study indicate that technology was a significant positive explanatory variable of knowledge acquisition, knowledge conversion, and protection; organizational culture was a significant positive explanatory variable of knowledge management performance, and knowledge application; structure was a significant positive explanatory v ariable of knowledge management performance, knowledge acquisition, knowledge conversion, knowledge application, and knowledge protection, and knowledge acquisition, knowledge application, and knowledge protection were significant positive explanatory variables of knowledge management performance.

Further the author argued that knowledge management performance was regarded as a dependent variable, and both knowledge management enablers and process are dependent variables. Knowledge management performance might be able to impact on the knowledge management enablers and process capability through a feed-back mechanism. Enhanced productivity of customer satisfaction can stimulate the improvement of capability in both the aspect of enablers and process.

Lindsey (2002) proposed a KM effectiveness model based on combining Organizational Capability Perspective Theory and Contingency Perspective Theory. The model defines KM effectiveness in terms of two main constructs: *Knowledge Infrastructure Capability* and Knowledge Process Capability, with the Knowledge Process Capability construct being influenced by a Knowledge Task. Knowledge infrastructure capability represents social capital; the relationships between knowledge sources and users; and is operationalized by technology (the network itself), structure (the relationship), and culture integration of KM processes into the organization, and is operational zed by acquisition (the capturing of knowledge), conversion (making captured knowledge available), application (degree to which knowledge is useful), and protection (security of the knowledge). Tasks are activities performed by organizational units and indicate the type and domain of the knowledge being used. Tasks ensure the right knowledge is being captured and used. KM success is measured as satisfaction with the KMS.

2.15 Research Gap

In reality, while KM seems to be successfully implemented in large organizations, it is largely neglected by small and medium sized firms (SMEs). Moreover, in order to compete, like any large enterprises, SMEs need to retain appropriate and up-to-date knowledge or else there may be knowledge leakage and consequent losses in efficiency, productivity and competitiveness. The following are the research gaps that are identified in this study:

1. Most studies pertain to international context.
2. Scanty study is found in KM practices of auto component sector in India.
3. Existing studies conducted pertain to storage and access only
4. Limited studies on knowledge management practices among the management levels especially strategic and operational level of SMEs on KM
5. The research identified a gap in terms of process of KM especially the knowledge Management infrastructure and its relationship with KM processes in auto component manufacturing sector.

2.16 Chapter Summary

This chapter explained the review of literature made for this research study. It covered the topics such as perceptions of KM, KM capabilities with respect to competitive advantage, ICT and KM, KM and performance, KM in Asian countries, learning organizations, and culture. It also explained the studies pertaining to KM in SMEs, Industry clusters, Automotive Industries – International and Indian Context. The review of literature helped to identify the research gap which made to further research study.

Chapter 3

RESEARCH METHODOLOGY

Chapter 3

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3.1 Introduction

This chapter discusses the complete research methodology aspects of the study comprising problem statement, scope of study, research objectives, development of conceptual model, formulation of research hypotheses, research design, questionnaire development and its administration which includes target respondents, sampling technique, pilot study incorporated and the data collection methods. Further, it briefly describes the tools of analysis used in this research study. Finally, the limitations of the study are discussed.

3.2 Problem Statement

Though KM is actively being perused and practiced in large organizations, there is not much literature that supports its usage in SMEs, especially with respect to auto component manufacturing industries.

SMEs play a pivotal role in any national economy. The continued successes of SMEs might further be improved if their knowledge management practices are placed on a sound foothold. This assumption is in line with the views expressed by Antoncic and Omerzel (2008:1184), namely that the management of knowledge assets may be critical to provide small companies with new tools with which to survive, grow and maintain a sustainable competitive advantage.

The study is endeavored to ascertain firstly

1. Whether KM is being used in SMEs in the management levels?
2. To what extent KM is being practiced among the strategic and operational levels?
3. To identify the KM infrastructure dimensions that support KM processes?
4. To identify the level of ICT facility and usage in KM process in SME?
5. How effectively KM is being practiced in SMEs in comparison with large organization of auto component manufacturing enterprises?

3.3 Scope of the Research

The geographic area is limited to the SMEs of auto component manufacturing in Pune region to promote a homogeneous sample, and also large auto component manufacturing were taken for comparison. The KM infrastructure, KM process, KM strategy and the ICT infrastructure are the components covered in this research.

3.4 Research Objectives

As discussed above, auto component SMEs could bring betterment by adopting a systematic KM practices and process. This study attempts to analyze these KM processes and how effectively it could be followed to enhance their day-to-day business activities.

The Study aims:

- To explore the level with which KM dimensions followed in SMEs.
- To study how the Knowledge Management process is being adopted in SMEs
- To study how the Knowledge Management practices is being adopted in SMEs
- To explore to what extent information and communication technology is being used for the process of knowledge acquisition, storage and preservation, and sharing.
- To make a comparative study between SMEs and Large auto component firms on various dimensions including KM Infrastructure, KM Strategy, and KM Process and ICT infrastructure.
- To suggest better strategies of KM practices to SMEs that may help them in becoming more competitive.

3.5 Data Sources

Primary as well as secondary data sources have been used in this research study. The primary data for this study have been collected from the auto component manufacturing firms of Pune District. The method of data collection from primary sources has been described in Section 3.10.5. For the secondary data, various studies were pursued from University of Pune library, British Library, Pune and for the SMEs and its structure and categories of Pune, Maharatta Chambers of Commerce Industries

and Agriculture (MCCIA), Pune Chapter were contacted. Various national and international journals of KM Journal, Science Direct, Springer, Inderscience, Emerald online journals were referred which gave a more insight for the researcher in this study.

3.6 Development of Conceptual Model

The Conceptual model was developed based on the KM models given by various authors which has been listed and described in Chapter 2.14. The researcher has made an extensive review of literature to develop a conceptual model. The review was to understand the different KM dimensions that could be linked to frame a model especially with Indian context. This helped to identify four KM strategies, six KM Practices variables of Strategic level and five different KM infrastructure dimensions and three KM process dimensions of operational level. The following are the various dimensions used in this study:

Table 3.1: KM Strategy Dimensions

Dimension	Description
KM policy	a written policy or strategy that promotes KM being framed
KM plan	Has policies or programs intended to improve employee knowledge
KM Budget Allocation	Has allocated financial resources to support knowledge management initiatives
ICT investment	Has invested in information and communication technologies (i.e. intranet, database, email and digital libraries to facilitate knowledge management

Table 3.2: KM Practice variables at Strategic level

Dimension	Description
Organizational benefits	The organizational benefits of a knowledge-centric organization are clearly understood by the strategic level.
Top priority	Knowledge management is a top priority in our organization
Value system	Has a value system or culture intended to encourage knowledge sharing
Strategic partnerships	Uses partnerships or strategic alliances to acquire knowledge
KM initiatives	Has a clear and strong commitment to knowledge management initiatives
Rewarding system	Has reward systems for continuous learning or knowledge sharing

Operational Level focuses on the dimensions:

- Knowledge Management Infrastructure
- Information and communication Technology (ICT) Infrastructure
- Knowledge Management Process

Table 3.3: Knowledge Management Infrastructure dimensions

Dimension	Description
Culture	This described culture being followed among the employees with respect to knowledge management.
Employee Participation	This described attitude being followed among the employees with respect to knowledge management.
Leadership	This described leadership role being followed among the employees with respect to knowledge management.
Rewarding with Incentives	This described the rewarding support that the organization provides as an encouragement for implementing Knowledge Management.
Training and Mentoring	This described how training and mentoring being implemented as a part of KM

Table 3.4: Information and Communication Technology (ICT) Infrastructure dimensions

Dimension	Description
ICT Facility	This described what sort of Information and Communication Technology (ICT) facilities is provided to practice knowledge management.
ICT Usage	This described the ICT usage in KM Process

Table 3.5: Knowledge Management Process Dimensions

Dimension	Description and Elements
Knowledge Capture and Acquisition	This described the knowledge being captured or acquired by the employees.
Knowledge Storage and Preservation	This described knowledge being stored and preserved in the organization for future usage.
Knowledge Sharing	This described knowledge being shared or disseminated by the employees.

Based on the above described variables and dimensions the conceptual model was developed by the researcher which was tested in this study. The conceptual model describes the KM infrastructure dimensions such as Culture, Employee Participation, Leadership, Rewarding with Incentives and Training and Mentoring. KM Strategy dimensions which include KM policy, KM plan, KM budget allocation and ICT investment. ICT infrastructure comprises ICT facility and ICT usage. These are the independent variables tested against the dependent variable which is the KM Process dimensions that include Knowledge Acquisition and capture, Knowledge Storage & Preservation and Knowledge Sharing.

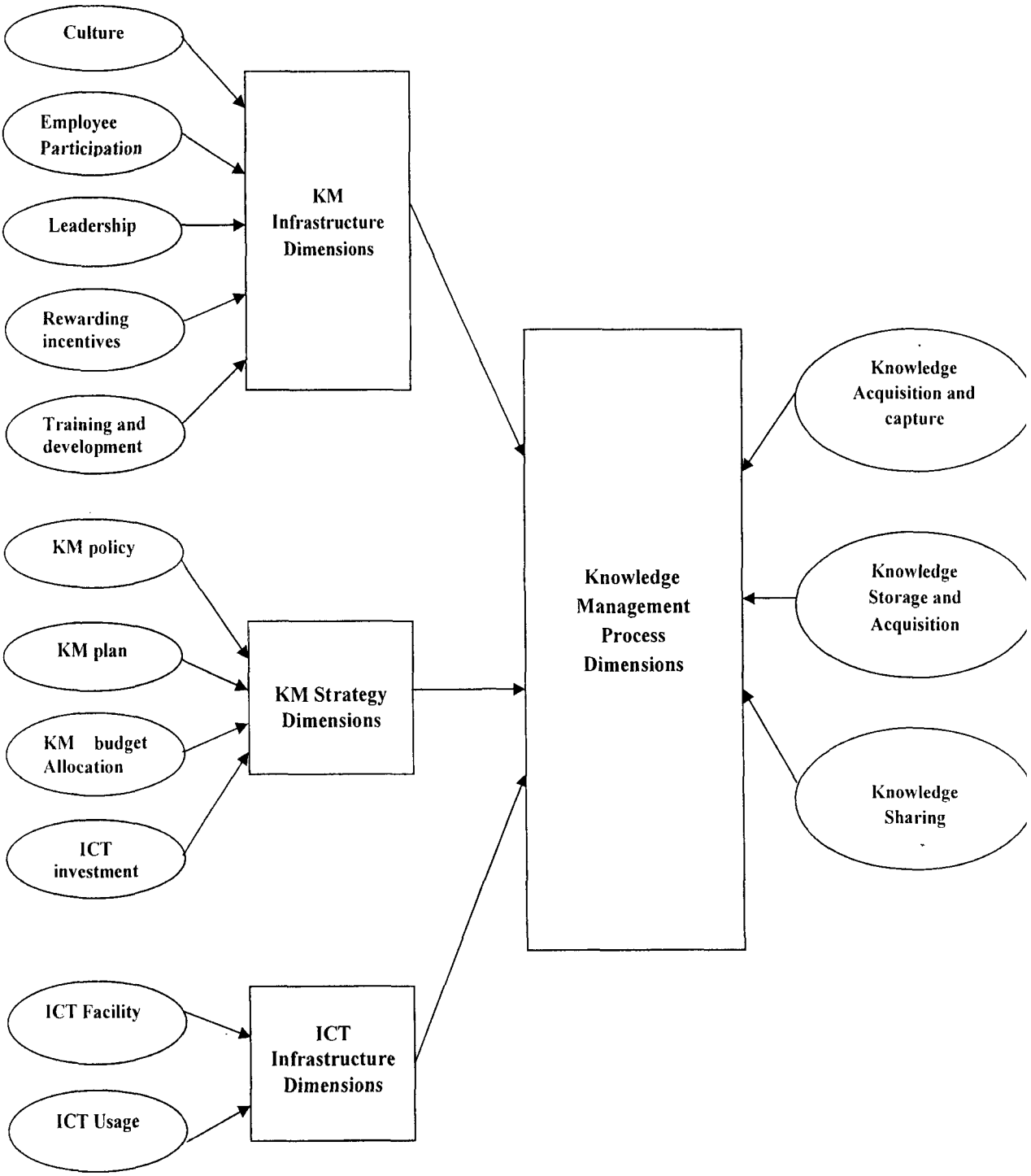

Figure 3.1: Conceptual Model (*Source: Developed by Researcher)*

3.7 Formulation of Research Hypotheses

For the present study, eight sets of hypothesis were formulated. There are forty-nine hypotheses in all. The First set comprises of two hypotheses formulated on the basis of KM dimensions across management levels which is the strategic and operational level respectively. Second set comprises of fifteen hypotheses based on the impact of KM infrastructure on KM process, Third set consists of twelve hypotheses based on the impact of KM strategy on KM process. Fourth set comprises of six hypotheses based on the impact of ICT infrastructure on KM process, Fifth set depicts the comparison between SMEs and large auto component firms based on KM infrastructure consisting of five hypotheses, Sixth set consists of four hypotheses based on comparison of SMEs with large firms with respect to KM strategy, Seventh set depicts three hypotheses on comparison of SMEs with large on KM process and lastly two hypotheses on comparison of SMEs and large on ICT infrastructure dimensions.

3.7.1 KM Dimensions across Management Levels

$H_0$1: There is no significant difference in KM practices being practiced between high and low responses of strategic levels of SMEs

$H_1$1: There is a significant difference in KM practices being practiced between high and low responses of strategic levels of SMEs

$H_0$2: There is no significant difference in KM practices being practiced between high and low responses of operational level of SMEs.

$H_1$2: There is no significant difference in KM practices being practiced between high and low responses of operational level of SMEs.

3.7.2 Impact of KM Infrastructure Dimensions on KM Process

$H_0$3: There is no significant impact of culture as a dimension of KM infrastructure on knowledge acquisition and capture.

$H_1$3: There is a significant impact of culture as a dimension of KM infrastructure on knowledge acquisition and capture.

$H_0$4: There is no significant impact of employee participation as a dimension of KM infrastructure on knowledge acquisition and capture.
$H_1$4: There is a significant impact of employee participation as a dimension of KM infrastructure on knowledge acquisition and capture.

$H_0$5: There is no significant impact of leadership as a dimension of KM infrastructure on knowledge acquisition and capture.
$H_1$5: There is a significant impact of leadership as a dimension of KM infrastructure on knowledge acquisition and capture

$H_0$6: There is no significant impact of rewarding with incentives as a dimension of KM infrastructure on knowledge acquisition and capture
$H_1$6: There is significant impact of rewarding with incentives as a dimension of KM infrastructure on knowledge acquisition and capture

$H_0$7: There is no significant impact of training and mentoring as a dimension of KM infrastructure on knowledge acquisition and capture
$H_1$7: There is a significant impact of training and mentoring as a dimension of KM infrastructure on knowledge acquisition and capture

$H_0$8: There is no significant impact of culture as a dimension of KM infrastructure on knowledge storage and preservation.
$H_1$8: There is a significant impact of culture as a dimension of KM infrastructure on knowledge storage and preservation.

$H_0$9: There is no significant impact of employee participation as a dimension of KM infrastructure on knowledge storage and preservation.
$H_1$9: There is a significant impact of employee participation as a dimension of KM infrastructure on knowledge storage and preservation.

$H_0$10: There is no significant impact of leadership as a dimension of KM infrastructure on knowledge storage and preservation.

$H_1$10: There is a significant impact of leadership as a dimension of KM infrastructure on knowledge storage and preservation.

$H_0$11: There is no significant impact of rewarding with incentives as a dimension of KM infrastructure on knowledge storage and preservation.
$H_1$11: There is a significant impact of rewarding with incentives as a dimension of KM infrastructure on knowledge storage and preservation.

$H_0$12: There is no significant impact of training and mentoring as a dimension of KM infrastructure on knowledge storage and preservation.
$H_1$12: There is a significant impact of training and mentoring as a dimension of KM infrastructure on knowledge storage and preservation.

$H_0$13: There is no significant impact of culture as a dimension of KM infrastructure on knowledge sharing.
$H_1$13: There is a significant impact of culture as a dimension of KM infrastructure on knowledge sharing.

$H_0$14: There is no significant impact of employee participation as a dimension of KM infrastructure on knowledge sharing.
$H_1$14: There is a significant impact of employee participation as a dimension of KM infrastructure on knowledge sharing.

$H_0$15: There is no significant impact of leadership as a dimension of KM infrastructure on knowledge sharing.
$H_1$15: There is a significant impact of leadership as a dimension of KM infrastructure on knowledge sharing.

$H_0$16: There is no significant impact of rewarding with incentives as a dimension of KM infrastructure on knowledge sharing.
$H_1$16: There is a significant impact of rewarding with incentives as a dimension of KM infrastructure on knowledge sharing.

$H_0$17: There is no significant impact of training and mentoring as a dimension of KM infrastructure on knowledge sharing.

$H_1$17: There is a significant impact of training and mentoring as a dimension of KM infrastructure on knowledge sharing.

3.7.3 Impact of KM Strategy Dimensions on KM Process

$H_0$18: There is no significant impact of KM policy as a dimension of KM Strategy on knowledge acquisition and capture.

$H_1$18: There is a significant impact of KM policy as a dimension of KM Strategy on knowledge acquisition and capture.

$H_0$19: There is no significant impact of KM plan as a dimension of KM Strategy on knowledge acquisition and capture.

$H_1$19: There is a significant impact of KM plan as a dimension of KM Strategy on knowledge acquisition and capture.

$H_0$20: There is no significant impact of KM budget allocation as a dimension of KM Strategy on knowledge acquisition and capture.

$H_1$20: There is a significant impact of KM budget allocation as a dimension of KM Strategy on knowledge acquisition and capture.

$H_0$21: There is no significant impact of ICT investment as a dimension of KM Strategy on knowledge acquisition and capture.

$H_1$21: There is a significant impact of ICT investment as a dimension of KM Strategy on knowledge acquisition and capture.

$H_0$22: There is no significant impact of KM policy as a dimension of KM Strategy on knowledge storing and preservation.

$H_1$22: There is a significant impact of KM policy as a dimension of KM Strategy on knowledge storing and preservation.

$H_0$23: There is no significant impact of KM plan as a dimension of KM Strategy on knowledge storing and preservation.
$H_1$23: There is a significant impact of KM plan as a dimension of KM Strategy on knowledge storing and preservation.

$H_0$24: There is no significant impact of KM budget allocation as a dimension of KM Strategy on knowledge storing and preservation.
$H_1$24: There is a significant impact of KM budget allocation as a dimension of KM Strategy on knowledge storing and preservation.

$H_0$25: There is no significant impact of ICT investment as a dimension of KM Strategy on knowledge storing and preservation.
$H_1$25: There is a significant impact of ICT investment as a dimension of KM Strategy on knowledge storing and preservation.

$H_0$26: There is no significant impact of KM policy as a dimension of KM Strategy on knowledge sharing.
$H_1$26: There is a significant impact of KM policy as a dimension of KM Strategy on knowledge sharing.

$H_0$27: There is no significant impact of KM plan as a dimension of KM Strategy on knowledge sharing.
$H_1$27: There is a significant impact of KM plan as a dimension of KM Strategy on knowledge sharing.

$H_0$28: There is no significant impact of KM budget allocation as a dimension of KM Strategy on knowledge Sharing.
$H_1$28: There is a significant impact of KM budget allocation as a dimension of KM Strategy on knowledge sharing.

$H_0$29: There is no significant impact of ICT investment as a dimension of KM Strategy on knowledge sharing.

$H_1$29: There is a significant impact of ICT investment as a dimension of KM Strategy on knowledge sharing.

3.7.4 Impact of ICT Infrastructure Dimensions on KM Process

$H_0$30: There is no significant impact of ICT facility as a dimension of ICT infrastructure on knowledge acquisition and capture.

$H_1$30: There is a significant impact of ICT facility as a dimension of ICT infrastructure on knowledge acquisition and capture.

$H_0$31: There is no significant impact of ICT usage as a dimension of ICT infrastructure on knowledge acquisition and capture.

$H_1$31: There is a significant impact of ICT usage as a dimension of ICT infrastructure on knowledge acquisition and capture.

$H_0$32: There is no significant impact of ICT facility as a dimension of ICT infrastructure on knowledge storage and preservation

$H_1$32: There is a significant impact of ICT facility as a dimension of ICT infrastructure on knowledge storage and preservation

$H_0$33: There is no significant impact of ICT usage a dimension of ICT infrastructure on knowledge storage and preservation

$H_1$33: There is a significant impact of ICT usage as a dimension of ICT infrastructure on knowledge storage and preservation

$H_0$34: There is no significant impact of ICT facility as a dimension of ICT infrastructure on knowledge sharing

$H_1$34: There is a significant impact of ICT facility as a dimension of ICT infrastructure on knowledge sharing

$H_0$35: There is no significant impact of ICT usage as a dimension of ICT infrastructure on knowledge sharing

$H_1$35: There is a significant impact of ICT usage as a dimension of ICT infrastructure on knowledge sharing

3.7.5 Comparison of SMEs with Large on KM Infrastructure Dimensions

$H_0$36: There is no significant difference on culture as a dimension of KM infrastructure among SMEs and large organizations.

$H_1$36: There is a significant difference on culture as a dimension of KM infrastructure among SMEs and large organizations.

$H_0$37: There is no significant difference on employee participation as a dimension of KM infrastructure among SMEs and large organizations.

$H_1$37: There is a significant difference on employee participation as a dimension of KM infrastructure among SMEs and large organizations.

$H_0$38: There is no significant difference on leadership as a dimension of KM infrastructure among SMEs and large organizations.

$H_1$38: There is a significant difference on leadership as a dimension of KM infrastructure among SMEs and large organizations.

$H_0$39: There is no significant difference on rewarding with incentives as a dimension of KM infrastructure among SMEs and large organizations.

$H_1$39: There is a significant difference on rewarding with incentives as a dimension of KM infrastructure among SMEs and large organizations.

$H_0$40: There is no significant difference on training and mentoring as a dimension of KM infrastructure among SMEs and large organizations.

$H_1$40: There is a significant difference on training and mentoring as a dimension of KM infrastructure among SMEs and large organizations.

3.7.6 Comparison of SMEs with Large on KM Strategy Dimensions

$H_0$41: There is no significant difference of KM policy as a dimension of KM strategy among SMEs and large organizations.

$H_1$41: There is a significant difference of KM policy as a dimension of KM strategy among SMEs and large organizations.

$H_0$42: There is no significant difference of KM plan as a dimension of KM strategy among SMEs and large organizations.
$H_1$42: There is a significant difference of KM plan as a dimension of KM strategy among SMEs and large organizations.

$H_0$43: There is no significant difference of KM budget allocation as a dimension of KM strategy among SMEs and large organizations.
$H_1$43: There is a significant difference of KM budget allocation as a dimension of KM strategy among SMEs and large organizations.

$H_0$44: There is no significant difference of ICT investment as a dimension of KM strategy among SMEs and large organizations.
$H_1$44: There is a significant difference of ICT investment as a dimension of KM strategy among SMEs and large organizations.

3.7.7 Comparison of SMEs with Large on KM Process Dimensions

$H_0$45: There is no significant difference of knowledge acquisition and capture as a dimension of KM Process among SMEs and large organizations.
$H_1$45: There is a significant difference of knowledge acquisition and capture of KM Process among SMEs and large organizations.

$H_0$46: There is no significant difference of knowledge storage and preservation as a dimension of KM process among SMEs and large organizations.
$H_1$46: There is a significant difference of knowledge storage and preservation as a dimension of KM process among SMEs and large organizations.

$H_0$47: There is no significant difference of knowledge sharing as a dimension of KM process among SMEs and large organizations.

$H_1$47: There is a significant difference of knowledge sharing as a dimension of KM process among SMEs and large organizations.

3.7.8 Comparison of SMEs with Large on ICT Infrastructure Dimensions

$H_0$48: There is no significant difference of ICT facility as a dimension of ICT infrastructure among SMEs and large organizations.

$H_1$48: There is a significant difference of ICT facility as a dimension of ICT infrastructure among SMEs and large organizations.

$H_0$49: There is no significant difference of ICT usage as a dimension of ICT infrastructure among SMEs and large organizations.

$H_1$49: There is a significant difference of ICT usage as a dimension of ICT infrastructure among SMEs and large organizations.

3.8 Research Design

This research design of this research study has two major phases:

Phase I –***Descriptive Research design*** in which a conceptual model was developed covering the different dimensions of the study.

Phase II – ***Cause-effect based Expost facto research design*** was used. The term ex post facto according to Landman (1988: 62) is used to refer a study that attempts to discover the pre-existing causal conditions between groups.

The following procedures when conducting ex post facto-research:

- The first step should be to state the problem.
- Following this is the determination of the group to be investigated. Two groups of the population that differ with regard to the variable should be selected in a proportional manner for the test sample.
- Groups, according to variables, are set equal by means of paring off and statistical techniques of identified independent and dependent variables.
- Data is collected. Techniques like questionnaires, interviews, literature search etc. are used to determine the differences.

- Next follows the interpretation of the research results. The hypothesis is either confirmed or rejected.(Jacobs et al. (1992: 81)). The researcher attempts to discover causes even when they cannot control the variables

The research technique employed in this study was ***Questionnaire-based survey.*** This survey is an established approach to get the respondent's opinion on a range of issues related to a research problem. This research was used to gain an insight, in terms of breadth as well as depth, regarding the KM practices adopted by auto components firms of Pune District. Further, a comparative study was done based on the different dimensions with respect to SMEs and large firms.

3.9 Questionnaire Development

3.9.1 Pilot Study

The questionnaire was designed after reviewing the previous available literature and studies pertaining to KM. Many executives, academicians and researchers were questioned to get a clear picture of what they perceived to be effective instructional design principles for KM. A pilot study was conducted among selected companies which aimed to refine the existing questions to get a good clarity. It was done to get feedback from the participants and to remove the questions which were of limited significance.

3.9.2 Final Questionnaire

Two different sets of questionnaires one for the Strategic / top level executives which focuses on the strategic support and practice on knowledge management of top level and other for the operations level to know the KM practices implemented which has been examined. The questionnaire was framed with closed type questions in a five-point Likert-scale style format as Strongly Agree, Agree, Can't say / Don't Know, Disagree, Strongly Disagree.

Table 3.6: Five point Likert-Scale as measurement scale

Value	Meaning Assigned
Strongly Agree (SA)	You are in agreement with the statement to a very high extent
Agree (A)	You believe that statement is true to some extent
Don't know/Can't say (DK/CS)	You do not know about it or cannot say
Disagree (D)	You believe that statement is not true to some extent
Strongly Disagree (SD)	You totally disagree with the statement

The strategic level had two sections. Section A dealt with organization profile and personal profile of the respondents. Section B dealt with KM practice variables and KM Strategy.

The operational level consisted of four sections. Section A had organization profile and personal profile of the respondents Section B dealt with KM infrastructure dimensions such as culture, employee participation, leadership, rewarding with incentives and training and mentoring being followed. Section C consisted of ICT infrastructure dimensions which had ICT facility and its usage and the lastly section D dealt with KM process dimensions which are followed in the organizations having components like knowledge acquisition and capture, knowledge storage and preservation and knowledge sharing.

3.9.3 Structure and Content validity of the questionnaire

The questionnaire was tested for content and construct validity.

Content Validity- An instrument has content validity if it has measurement items that adequately cover the content domains or aspects of the concept being measured (Ahire et al., 1996). It is not assessed numerically, but can only be subjectively judged by the researchers (Saraph et al.,1989; Gotzamani and Tsiotras, 2001). Refers to the extent to which the content of items represents the entire body of content to be measured. The instrument used in this study has been framed after careful and extensive review of the relevant literature. The questionnaire is validated with the experts for their opinion and consultation so as to remove some of the items which were not fit according to the specialist in the field of management.

Construct Validity- Construct Validity is used to ensure that the measure is actually measure what it is intended to measure (i.e. the construct), and not other variables. First of all,

- Field work was done at different sites before starting data collection. Thereby got into the normal work procedures from the company and got a better understanding of which data sources to select and which questions to be further included in questionnaire. It was important to do this test because this study was done to understand the level of KM practices among two different levels of management who differ in the level of thinking, nature of work that they do, educational background, experiences, etc.

3.9.4 Reliability Analysis

The degree of consistency between two measures of the same thing. (Mehrens and Lehman, 1987). • The measure of how stable, dependable, trustworthy, and consistent a test is in measuring the same thing each time (Worthen et al., 1993). The Cronbach alpha coefficient was used to estimate the internal consistency and reliability of a measure. A generally agreed lower limit of the Cronbach's alpha coefficient is 0.7 Nunnally(1978).

Table 3.7: Reliability Analysis

Dimensions	Number of Items	Cronbach's Alpha
KM at strategic level	10	**0.84**
KM at operational level		
Culture	10	**0.79**
Employee Participation	12	**0.83**
Leadership	8	**0.85**
Rewarding with incentives	2	**0.69**
Training and Mentoring	10	**0.88**
ICT facility	11	**0.92**
ICT usage	9	**0.86**
Knowledge Capture and Acquisition	11	**0.91**
Knowledge Storage and Preservation	8	**0.90**
Knowledge Sharing	17	**0.93**

The above summarizes the results of the reliability analysis of the study for each dimension. As can be seen, the Cronbach alpha values for the factors ranged approximately between 0.70 and 0.92. This provides evidence that all the dimensions have high internal consistency, and are thus reliable. Generally, alpha values greater than 0.7 are regarded as sufficient (Nunnally, 1994; Cuieford, 1965), although a cut-off value of 0.6 was used by researchers such as Black and Porter (1996), Rungasamy et al. (2002) and Antony et al. (2002).

3.10 Questionnaire Administration

Administration of questionnaire was done in order to collect relevant data from the sources. The target population was analyzed and samples were drawn accordingly.

3.10.1 Target Respondents

Respondents belong to auto components manufacturing sector and related services. Those organizations which were registered under Maharatta Chambers of Commerce Industries and Agriculture (MCCIA), Pune chapter form the population. These were 325 SMEs and 29 large Auto component firms.

3.10.2 Sampling Technique

Stratified Sampling technique was used to select the companies as there were two categories of companies being grouped based on the investment slabs - Small and medium (SMEs) and large auto component firms. For the selection of respondents, stratified technique was used as the respondents were categorized into executives and non-executives based on the management levels. Further selection of respondent firms and respondents were based on researcher's judgement.

The respondents were classified on the basis of their position employed in Strategic or Operational level. Respondents from Strategic level were Top executives, CEO, Plant manager, General Managers, and managers. In SMEs top executives were the proprietors. Respondents from operational level were non-executives at supervisory level with the designations of supervisors, engineers and technicians etc.

3.10.3 Sample Size

Out of 325 organizations, the researcher contacted 60% of the population which is significantly higher than 20% which is a accepted norm for any survey based research. A response rate of 20% and above is considered to be desirable for survey findings. (Yu and Cooper, 1983). Malhotra and Grover (1988) have also suggested a response rate of 20% for positive assessment of the surveys. This was done on the assumption some would not respond and some of the filled in questionnaire might not be usable. Selection of these 60% (180 firms) was based on the researcher's judgment. Similarly the researcher selected 60% (18 firms) of large firms were as judgmental sampling.

In total 132 filled in questionnaires were received from 66 SMEs and 13 large firms and taken for data analysis. This gave an overall response rate of 40.61% among both SMEs and large firms. Rest of the questionnaires was received back because the organizations did not show much of interest in responding for the survey. Also other questionnaires were incomplete or inadequate to be included in the survey hence discarded.

3.10.4 Data Collection Method

This survey was conducted during December 2010 to August 2011. Officially CD and the Industrial directory of Pune from MCCIA, Pune was collected. There were 325 Small and Medium Enterprises (SMEs) and 29 large auto component organizations which were registered under MCCIA, Pune. The organizations in Pimpri-Chinchwad MIDC, Chakan, Bhosari MIDC were personally contacted by getting a prior appointment from HR managers or through references and were collected personally. E-mails were also sent to the concerned references to get the questionnaire filled.

3.11 Tools of Analysis

This research study has used the questionnaire developed by the researcher as an instrument to collect the data. The data collected was analyzed using statistical tool SPSS 17.0. Using SPSS, different tests were conducted depending on the nature of the

data. The methods of data analysis used to answer the research questions and test hypotheses are as follows:

3.11.1 Reliability Analysis

Reliability of a scale is to examine its internal consistency by calculating Cronbach's alpha. This method indicates the extent to which items (elements) within a scale are homogenous or correlated (Saraph et al., 1989; Badri et al., 1995). It helps to determine whether the same set of items would elicit the same responses if the same questions are recast to the same respondents. Variables derived from test instruments are declared to be reliable only when they give reliable responses which are numerical coefficient of reliability

3.11.2 Descriptive Statistics

A set of brief descriptive coefficients that summarizes a given data set, which can either be a representation of the entire population or a sample. The measures used to describe the data set are measures of central tendency and measures of variability or dispersion. Measures of central tendency include the mean, median and mode, while measures of variability include the standard deviation (or variance), the minimum and maximum variables. Descriptive statistics provide a useful summary of security returns when performing empirical and analytical analysis, as they provide a historical account of return behavior. Although past information is useful in any analysis, one should always consider the expectations of future events.

3.11.3 The t Test

The t-test is applied when the comparison of means of two samples is to be drawn. When we have only two samples we can use the t-test to compare the means of the samples. The t-test assess whether the means of two samples are statistically different from each other.

3.11.4 Spearman's rho Correlation

It is often the case that the data we wish to measure the correlation for is not of the interval or ratio level of measurement. The Spearman rho correlation coefficient handles this situation due to the ordinal data.

The formula for calculating the Spearman rho correlation coefficient is as follows.

$$\text{rho(p)}=1-\frac{6\sum d^2}{n(n^2-1)}$$

n is the number of paired ranks and d is the difference between the paired ranks. If there are no tied scores, the Spearman rho correlation coefficient will be even closer to the Pearson product moment correlation coefficient. Also note that this formula can be easily understood when your realize that the sum of the squares from 1 to n can be expressed as $n(n + 1)(2n + 1)/6$. From this you can realize the least sum of d^2 is zero and the greatest sum of d^2 is twice the sum of the squares of the odd integers up to $n/2$ and this then scales such a sum between -1 and +1.

3.11.5 Multiple Regressions

Multiple regression analysis is a multivariate statistical technique used to examine the relationship between an outcome variable and several predictors (George and Mallery, 2003). Multiple regression analysis examines the relationships among variables, and the extent to which they are linked and explain the dependent variable (Gay, 1996).

3.11.6 Levene's Test for Equality of Variances

Levene's test is an inferential statistic used to assess the equality of variances in different samples. Some common statistical procedures assume that variances of the populations from which different samples are drawn are equal. Levene's test assesses this assumption. It tests the null hypothesis that the population variances are equal (called homogeneity of variance). If the resulting p-value of Levene's test is less than some critical value (typically 0.05), the obtained differences in sample variances are unlikely to have occurred based on random sampling. Thus, the null hypothesis of equal variances is rejected and it is concluded that there is a difference between the variances in the population. Procedures which typically assume homogeneity of variance include analysis of variance and t-tests. One advantage of Levene's test is that it does not require normality of the underlying data. Levene's test is often used before a comparison of means. When Levene's test is significant, modified procedures are used that do not assume equality of variance. Levene's test may also test a

meaningful question in its own right if a researcher is interested in knowing whether population group variances are different.

3.12 Limitations of the study

1. Participation and lack of willingness of respondents was identified to be a major problem in this study as is the case with any survey based research and therefore the responses from the participants were very low and reluctance in cooperating.

2. This study assumed that respondents were reflecting the true state of the companies however the individual perceptions and biasness might have crept in.

3. Dearth of studies in this area in the Indian context limited the scope of the detailed investigation.

4. This study was primarily on the focus of Pune region. A longitudinal approach is very important for a study of knowledge management process.

5. Further categorization of auto component firms was not included in the study.

6. As this study was conducted in auto component firms of Pune region, the findings may only be generalized to similar nature of industries but cannot be generalized to other groups, industries or countries.

7. Knowledge entities and types of knowledge have not been specifically considered in the study.

8. It is limited to the selected variables and components only.

3.13 Chapter Summary

This chapter revealed the problem statement, scope of study, research objectives, conceptual model, research hypotheses, research design, questionnaire development and its administration. This also included about the target respondents, sampling technique used in the study, pilot study, and the data collection methods which was followed in the research study. It also described the tools of analysis used in this research study. Finally, the limitations of the study were listed out. In the next chapter, data analysis and the discussion on these analyses are discussed.

Chapter 4
DATA ANALYSIS

Chapter 4
DATA ANALYSIS

4.1 Introduction

This chapter presents the data analysis and the results of the questionnaire based survey. The data collected from the organizations were analyzed with the application of statistical software tool SPSS 17.0 using Spearman's rho correlation, Regression analysis, t-test, Levene's test of equality of variances.

This Chapter presents a discussion and interpretation of the results. This study was to examine and explore the relationships among knowledge management infrastructure such as Culture, Employee participation, Leadership role, Rewarding schemes & Training & mentoring, ICT infrastructure, KM strategy with Knowledge process capability of SMEs of auto component manufacturing companies.

1. To describe the SMEs in terms of knowledge management strategies, knowledge management infrastructure, ICT infrastructure & knowledge management process capabilities;
2. To explore the relationships and impact of knowledge management strategies, knowledge management infrastructure, ICT infrastructure on knowledge management process.
3. To examine the difference of KM practices employed in the management levels that is the strategic and operational level among SMEs; and
4. To compare the above mentioned dimensions on SMEs and large auto component manufacturing firms.

The discussions pertaining to the forth-nine hypotheses are discussed in this chapter.

4.2 Hypothesis Testing – Hypothesis H1 – H49

Hypotheses formulated were tested in order to analyze the data. Statistical techniques such as Spearman's rho correlation, Regression analysis, t-test, Levene's test of equality of variances were applied. The results and the discussion of hypotheses testing have been presented in detail.

4.2.1 KM Dimensions across Management Levels

Hypothesis 1

$H_0$1: There is no significant difference in KM practices being practiced between high and low responses of strategic levels of SMEs

$H_1$1: There is a significant difference in KM practices being practiced between high and low responses of strategic levels of SMEs

Table 4.1: Difference in KM practice variables at Strategic level

KM variables	Mean group response	N	Mean	Std. Deviation	t value	Sig.
organizational benefits of KM	>= 35 (high)	55	4.22	.599	2.768	0.007
	< 35 (low)	11	3.64	.809		
Top priority to KM	>= 35	55	4.33	.640	3.687	0.003
	< 35	11	3.27	.905		
KM Value system	>= 35	55	4.29	.567	3.388	0.001
	< 35	11	3.64	.674		
Strategic partnerships	>= 35	55	3.93	.879	4.245	0.000
	< 35	11	2.64	1.120		
KM initiatives	>= 35	55	4.18	.547	4.176	0.001
	< 35	11	3.09	.831		
Reward systems	>= 35	55	4.13	.904	6.201	0.000
	< 35	11	2.18	1.168		

Discussion: The researcher has calculated actual mean because the frequency of responses below and above arithmetic mean were not satisfactory to understand the level of practices. The researcher still further wanted to understand the level of KM practices hence the actual mean calculated was 35. The responses >=35 were considered as a group high and <35 as low. The ANOVA-Levene's tests for equality of variances were applied for the variables.

The results are given in table 4.1 which implied that all KM variables at strategic level were having the sig values < 0.05 hence there is a significant difference in the mean value of KM practice variables at strategic level.

$H_0$1: There is no significant difference in KM practices being practiced between high and low responses of strategic levels of SMEs is rejected and the alternate hypothesis is not rejected.

Hypothesis 2

H_{02}: There is no significant difference in KM practices being practiced between high and low responses of operational levels of SMEs

$H_1$2: There is a significant difference in KM practices being practiced between high and low responses of operational levels of SMEs

Table 4.2: Difference in KM practice variables at Operational level

KM dimensions	Mean group response	N	Mean	Std Deviation	t	Sig.
KM Infrastructure Dimensions						
Culture	>= 220	50	40.96	3.597	6.188	0.000
		16	34.44	3.898		
Employee participation	>= 220	50	51.48	3.716	7.326	0.000
	< 220	16	42.75	5.323		
Leadership	>= 220	50	33.56	2.901	5.170	0.000
	< 220	16	27.00	4.803		
Rewarding with incentives	>= 220	50	8.54	1.515	5.681	0.000
	< 220	16	6.13	1.360		
Training and Mentoring	>= 220	50	39.24	5.535	6.070	0.000
	< 220	16	29.81	4.969		
KM Process Dimensions						
Knowledge Acquisition and capture	>= 122	53	42.81	5.854	7.579	0.000
	< 122	13	29.77	4.045		
Knowledge Storage and preservation	>= 122	53	31.38	3.824	7.685	0.000
	< 122	13	21.69	5.006		
Knowledge Sharing	>= 122	53	69.70	6.568	7.089	0.000
	< 122	13	49.92	9.517		

Discussion: To check this hypothesis, there were two categories of dimensions at the operational level. First is the KM Infrastructure dimensions - Culture, Employee participation, Leadership, Rewarding with incentives, and Training and Mentoring and KM Process variables - Knowledge Acquisition, Knowledge Storage and Preservation and Knowledge Sharing.

The researcher has calculated actual mean because the frequency of responses below and above arithmetic mean were not satisfactory to understand the level of practices. The researcher still further wanted to understand the level of KM practices hence the actual mean calculated was 220 and 122 for KM infrastructure and KM process variables respectively. The responses >=220 and >=122 were considered as a group high and <220 and <122 as low for KM infrastructure and KM process variables respectively. The ANOVA-levene's tests for equality of variances were applied for the variables.

The results are given in table 4.2 which implied that all KM variables at strategic level were having the sig values < 0.05 hence there is a significant difference in the mean value of KM practice variables at operational level.

Hence ***H_{02}: There is no significant difference in KM practices being practiced between high and low responses of operational levels of SMEs is rejected and the alternate hypothesis is not rejected.***

4.2.2 Impact of KM Infrastructure Dimensions on KM Process

Table 4.3: Spearman correlation coefficient of KM infrastructure on KM process

	Culture	Employee participation	Leadership	Rewarding with Incentives	Training & Mentoring
Culture	1				
Employee participation	.727**	1			
Leadership	.556**	.741**	1		
Rewarding with Incentives	.496**	.566**	.689**	1	
Training & Mentoring	.495**	.604**	.767**	.735**	1
Knowledge Acquisition and capture	.386**	.494**	.589**	.525**	.619**
Knowledge storage & preservation	.512**	.598**	.527**	.482**	.500**
Knowledge sharing	.538**	.601**	.674**	.587**	.619**
** Correlation is significant at 0.01 (2-tailed)					

The above table shows the overall correlation of the KM infrastructure dimensions with KM process dimensions. The correlation analysis shows a positive and direct relationship among KM infrastructure with KM process dimensions.

The regression statistics which was done on the independent variables (Predictors: culture, employee participation, leadership, rewarding with incentives and Training & mentoring) on the dependent variable of knowledge acquisition and capture. It revealed the overall goodness-of-fit measures as below:

$R^2 = 0.425$ that is 42.5% variation in the dependent variable which is explained by the independent variables. The Analysis of Variance (ANOVA) test depicted F=8.865 and sig value = 0.000.

The regression statistics which was done on the independent variables (Predictors: culture, employee participation, leadership, rewarding with incentives and Training &

mentoring) on the dependent variable of knowledge storage and preservation. It revealed the overall goodness-of-fit measures as below :

R^2 = 0.499 that is 49.5% variation in the dependent variable which is explained by the independent variables. The ANOVA test depicted F=11.951 and sig value = 0.000.

The regression statistics which was done on the independent variables (Predictors: culture, employee participation, leadership, rewarding with incentives and Training & mentoring) on the dependent variable of knowledge sharing. It revealed the overall goodness-of-fit measures as below :

R^2 = 0.59 that is 59.0% variation in the dependent variable which is explained by the independent variables. The ANOVA test depicted F=17.291 and sig value = 0.000.

Hypothesis 3

$H_0$3: There is no significant impact of culture as a dimension of KM infrastructure on knowledge acquisition and capture.

$H_1$3: There is a significant impact of culture as a dimension of KM infrastructure on knowledge acquisition and capture.

Table 4.4: Spearman's rho correlation of culture on knowledge acquisition and capture

	Culture	Sig.
Knowledge acquisition and capture	0.386**	0.001
** Correlation is significant at 0.01 level (2 tailed)		

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient results as given in the above table were 0.386 that showed significance at 0.01 confidence level. A positive and direct relationship among culture and knowledge acquisition and capture is noted.

Table 4.5: ANOVA and Regression Analysis-culture and knowledge acquisition and capture

	Mean	Std deviation	beta	t	sig
Culture	39.38	4.604	-0.054	-0.377	0.707

The regression analysis and ANOVA test was conducted to see the impact of culture on knowledge acquisition. The table above provides the t value being -0.377 and sig value is 0.707 which shows that culture is not having significance on knowledge acquisition.

Hence, hypothesis $H_0$3: There is no significant impact of culture as a dimension of KM infrastructure on knowledge acquisition and capture is not rejected and alternative hypothesis $H_1$3 is rejected.

Hypothesis 4

$H_0$4: There is no significant impact of employee participation as a dimension of KM infrastructure on knowledge acquisition and capture.
$H_1$4: There is a significant impact of employee participation as a dimension of KM infrastructure on knowledge acquisition and capture.

Table 4.6: Spearman's rho correlation of employee participation on knowledge acquisition and capture

	Employee participation	Sig.
Knowledge acquisition and capture	0.494**	0.000
** Correlation is significant at 0.01 level (2 tailed)		

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient results as given in the above table were 0.494 that showed significance at 0.01 confidence level. A positive and direct relationship among employee participation and knowledge acquisition and capture is noted.

Table 4.7: ANOVA and Regression Analysis-Employee participation and knowledge acquisition and capture

	Mean	Std deviation	beta	t	Sig.
Employee participation	49.36	5.582	0.231	1.291	0.201

The regression analysis and ANOVA test was conducted to see the impact of employee participation on knowledge acquisition and capture. The table above provides the t value being -1.291 and sig value is 0.201 which shows that employee participation is not having significance on knowledge acquisition and capture.

Hence, hypothesis H_04: There is no significant impact of employee participation as a dimension of KM infrastructure on knowledge acquisition and capture is not rejected and alternative hypothesis H_14 is rejected.

Hypothesis 5

H_05: There is no significant impact of leadership as a dimension of KM infrastructure on knowledge acquisition and capture.
H_15: There is a significant impact of leadership as a dimension of KM infrastructure on knowledge acquisition and capture

Table 4.8: Spearman's rho correlation of leadership on knowledge acquisition and capture

	leadership	Sig.
Knowledge acquisition and capture	0.589**	0.000
** Correlation is significant at 0.01 level (2 tailed)		

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient results as given in the above table were 0.589 that showed significance at 0.01 confidence level. A positive and direct relationship among leadership and knowledge acquisition and capture is noted.

Table 4.9: ANOVA and Regression Analysis-Leadership and knowledge acquisition and capture

	Mean	Std deviation	beta	t	Sig
Leadership	31.97	4.437	0.156	0.831	0.409

The regression analysis and ANOVA test was conducted to see the impact of leadership on knowledge acquisition and capture. The table above provides the t value being 0.831 and sig value is 0.409 which shows that leadership is not having significance on knowledge acquisition and capture.

Hence, hypothesis $H_0$5: There is no significant leadership as a dimension of KM infrastructure on knowledge acquisition and capture is not rejected and alternative hypothesis $H_1$5 is rejected.

Hypothesis 6

$H_0$6: There is no significant impact of rewarding with incentives as a dimension of KM infrastructure on knowledge acquisition and capture
$H_1$6: There is significant impact of rewarding with incentives as a dimension of KM infrastructure on knowledge acquisition and capture

Table 4.10: Spearman's rho correlation of rewarding with incentives on knowledge acquisition and capture

	rewarding with incentives	Sig.
Knowledge acquisition and capture	0.525**	0.000
** Correlation is significant at 0.01 level (2 tailed)		

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient results as given in the above table were 0.525 that showed significance at 0.01 confidence level. A positive and direct relationship among rewarding with incentives and knowledge acquisition and capture is noted.

Table 4.11: ANOVA and Regression Analysis-rewarding with incentives and knowledge acquisition and capture

	Mean	Std deviation	beta	t	Sig.
Rewarding with incentives	7.95	1.801	0.076	0.476	0.636

The regression analysis and ANOVA test was conducted to see the impact of rewarding with incentives on knowledge acquisition and capture. The table above provides the t value being -0.476 and sig value is 0.636 which shows that rewarding with incentives is not having significance on knowledge acquisition and capture.

Hence, hypothesis $H_0$6: There is no significant impact of rewarding with incentives as a dimension of KM infrastructure on knowledge acquisition and capture is not rejected and alternative hypothesis $H_1$6 is rejected.

Hypothesis 7

$H_0$7: There is no significant impact of training and mentoring as a dimension of KM infrastructure on knowledge acquisition and capture

$H_1$7: There is a significant impact of training and mentoring as a dimension of KM infrastructure on knowledge acquisition and capture

Table 4.12: Spearman's rho correlation of training and mentoring on knowledge acquisition and capture

	training and mentoring	Sig.
Knowledge acquisition and capture	0.619**	0.000
** Correlation is significant at 0.01 level (2 tailed)		

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient results as given in the above table were 0.619 that showed significance at 0.01 confidence level. A positive and direct relationship among training and mentoring and knowledge acquisition and capture is noted.

Table 4.13: ANOVA and Regression Analysis- Training and Mentoring and knowledge acquisition and capture

	Mean	Std deviation	beta	t	Sig.
Training and Mentoring	36.95	6.736	0.312	1.7	0.04

The regression analysis and ANOVA test was conducted to see the impact of Training and Mentoring on knowledge acquisition and capture. The table above provides the t value being 1.7 and Sig. value is 0.04 which shows that Training and Mentoring is having significance impact on knowledge acquisition and capture.

Hence, hypothesis $H_0$7: There is no significant impact of training and mentoring as a dimension of KM infrastructure on knowledge acquisition and capture is rejected and alternative hypothesis $H_1$7 is not rejected.

Hypothesis 8

$H_0$8: There is no significant impact of culture as a dimension of KM infrastructure on knowledge storage and preservation.

$H_1$8: There is a significant impact of culture as a dimension of KM infrastructure on knowledge storage and preservation.

Table 4.14: Spearman's rho correlation of culture on knowledge storage and preservation

	Culture	Sig.
knowledge storage and preservation	0.512**	0.000
** Correlation is significant at 0.01 level (2 tailed)		

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient results as given in the above table were 0.512 that showed significance at 0.01 confidence level. A positive and direct relationship among culture and knowledge storage and preservation is noted.

Table 4.15: ANOVA and Regression Analysis-culture and Knowledge storage and preservation

	Mean	Std deviation	beta	t	Sig.
culture	39.38	4.604	0.005	0.039	0.969

The regression analysis and ANOVA test was conducted to see the impact of culture on knowledge storage and preservation. The table above provides the t value being 0.039 and sig value is 0.969 which shows that culture is not having significance impact on knowledge storage and preservation.

Hence $H_0$8: There is no significant impact of culture as a dimension of KM infrastructure on knowledge storage and preservation is not rejected and $H_1$8 is rejected.

Hypothesis 9

$H_0$9: There is no significant impact of employee participation as a dimension of KM infrastructure on knowledge storage and preservation.
$H_1$9: There is a significant impact of employee participation as a dimension of KM infrastructure on knowledge storage and preservation.

Table 4.16: Spearman's rho correlation of employee participation on knowledge storage and preservation

	Employee participation	Sig.
knowledge storage and preservation	0.598**	0.000
** Correlation is significant at 0.01 level (2 tailed)		

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient results as given in the above table were 0.598 that showed significance at 0.01 confidence level. A positive and direct relationship among employee participation and knowledge storage and preservation is noted.

Table 4.17: ANOVA and Regression Analysis- Employee participation and Knowledge storage and preservation

	Mean	Std deviation	beta	t	Sig.
Employee participation	49.36	5.582	0.361	2.159	0.035

The regression analysis and ANOVA test was conducted to see the impact of employee participation on knowledge storage and preservation. The table above provides the t value being 2.159 and sig value is 0.035 which shows that there is a significance of employee participation on knowledge storage and preservation

Hence, $H_0$9: There is no significant impact of employee participation as a dimension of KM infrastructure on knowledge storage and preservation is rejected and $H_1$9 is not rejected.

Hypothesis 10

$H_0$10: There is no significant impact of leadership as a dimension of KM infrastructure on knowledge storage and preservation.
$H_1$10: There is a significant impact of leadership as a dimension of KM infrastructure on knowledge storage and preservation.

Table 4.18: Spearman's rho correlation of leadership on knowledge storage and preservation

	leadership	Sig.
knowledge storage and preservation	0.527**	0.000
** Correlation is significant at 0.01 level (2 tailed)		

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient results as given in the above table were 0.527 that showed significance at 0.01 confidence level. A positive and direct relationship among leadership and knowledge storage and preservation is noted.

Table 4.19: ANOVA and Regression Analysis- Leadership and Knowledge storage and preservation

	Mean	Std deviation	beta	t	Sig.
Leadership	31.97	4.437	0.264	1.504	0.138

The regression analysis and ANOVA test was conducted to see the impact of leadership on knowledge storage and preservation. The table above provides the t value being 1.504 and sig value is 0.138 which shows that leadership is not having significance on knowledge storage and preservation

Hence $H_0$10: There is no significant impact of leadership as a dimension of KM infrastructure on knowledge storage and preservation is not rejected and $H_1$10 is rejected.

Hypothesis 11

$H_0$11: There is no significant impact of rewarding with incentives as a dimension of KM infrastructure on knowledge storage and preservation.
$H_1$11: There is a significant impact of rewarding with incentives as a dimension of KM infrastructure on knowledge storage and preservation.

Table 4.20: Spearman's rho correlation of rewarding with incentives on knowledge storage and preservation

	rewarding with incentives	Sig.
knowledge storage and preservation	0.482**	0.000
** Correlation is significant at 0.01 level (2 tailed)		

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient results as given in the above table were 0.482 that showed significance at 0.01 confidence level. A positive and direct relationship among rewarding with incentives and knowledge storage and preservation is noted.

Table 4.21: ANOVA and Regression Analysis-Rewarding with incentives and Knowledge storage and preservation

	Mean	Std deviation	beta	t	Sig.
Rewarding with incentives	7.95	1.801	-0.005	-0.036	0.972

The regression analysis and ANOVA test was conducted to see the impact of rewarding with incentives on knowledge storage and preservation. The table above provides the t value being -0.036 and sig value is 0.972 which shows that rewarding with incentives is not having significance on knowledge storage and preservation

Hence, $H_0$11: There is no significant impact of rewarding with incentives as a dimension of KM infrastructure on knowledge storage and preservation is not rejected and $H_1$11 is rejected.

Hypothesis 12

$H_0$12: There is no significant impact of training and mentoring as a dimension of KM infrastructure on knowledge storage and preservation.
$H_1$12: There is a significant impact of training and mentoring as a dimension of KM infrastructure on knowledge storage and preservation.

Table 4.22: Spearman's rho correlation coefficient of training and mentoring on knowledge storage and preservation

	training and mentoring	Sig.
knowledge storage and preservation	0.500**	0.000
** Correlation is significant at 0.01 level (2 tailed)		

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient result as given in the above table was 0.500 that showed significance at 0.01 confidence level. A positive and direct relationship among training and mentoring and knowledge storage and preservation is noted.

Table 4.23: ANOVA and Regression Analysis- Training and mentoring and knowledge storage and preservation

	Mean	Std deviation	beta	t	Sig.
Training and mentoring	36.95	6.736	0.16	0.936	0.353

The regression analysis and ANOVA test was conducted to see the impact of training and mentoring on knowledge storage and preservation. The table above provides the t value being 0.936 and sig value is 0.353 which shows that training and mentoring is not having significant impact on knowledge storage and preservation

Hence, $H_0$12: There is no significant impact of training and mentoring as a dimension of KM infrastructure on knowledge storage and preservation is not rejected and the alternative hypothesis $H_1$12 is rejected.

Hypothesis 13

$H_0$13: There is no significant impact of culture as a dimension of KM infrastructure on knowledge sharing.
$H_1$13: There is a significant impact of culture as a dimension of KM infrastructure on knowledge sharing.

Table 4.24: Spearman's rho correlation of culture on knowledge sharing

	Culture	Sig.
knowledge sharing	0.538**	0.000
** Correlation is significant at 0.01 level (2 tailed)		

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient results as given in the above table were 0.538 that showed significance at 0.01 confidence level. A positive and direct relationship among culture and knowledge sharing is noted.

Table 4.25: ANOVA and Regression Analysis-Culture and Knowledge sharing

	Mean	Std deviation	beta	t	Sig.
Culture	39.38	4.604	0.014	0.114	0.91

The regression analysis and ANOVA test was conducted to see the impact of culture on knowledge sharing. The table above provides the t value being 0.114 and sig value is 0.91 which shows that culture is not having significance on knowledge sharing

Hence, $H_0$13: There is no significant impact of culture as a dimension of KM infrastructure on knowledge sharing is not rejected and $H_1$13 is rejected.

Hypothesis 14

$H_0$14: There is no significant impact of employee participation as a dimension of KM infrastructure on knowledge sharing.
$H_1$14: There is a significant impact of employee participation as a dimension of KM infrastructure on knowledge sharing.

Table 4.26: Spearman's rho correlation of employee participation on knowledge sharing

	Employee participation	Sig.
knowledge sharing	0.601**	0.000
** Correlation is significant at 0.01 level (2 tailed)		

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient results as given in the above table were 0.601 that showed significance at 0.01 confidence level. A positive and direct relationship among employee participation and knowledge sharing is noted.

Table 27: ANOVA and Regression Analysis- Employee participation and Knowledge sharing

	Mean	Std deviation	beta	t	Sig.
Employee participation	49.36	5.582	0.303	2.008	0.049

The regression analysis and ANOVA test was conducted to see the impact of employee participation on knowledge sharing. The table above provides the t value being 2.008 and sig value is 0.049 which shows employee participation is having significant impact on knowledge sharing.

Hence, $H_0$14: There is no significant impact of employee participation as a dimension of KM infrastructure on knowledge sharing is rejected and, $H_1$14 is not rejected.

Hypothesis 15

$H_0$15: There is no significant impact of leadership as a dimension of KM infrastructure on knowledge sharing.
$H_1$15: There is a significant impact of leadership as a dimension of KM infrastructure on knowledge sharing.

Table 4.28: Spearman's rho correlation of leadership on knowledge sharing

	leadership	Sig.
knowledge sharing	0.674**	0.000
** Correlation is significant at 0.01 level (2 tailed)		

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient results as given in the above table were 0.674 that showed significance at 0.01 confidence level. A positive and direct relationship among leadership and knowledge sharing is noted.

Table 4.29: ANOVA and Regression Analysis- Leadership and Knowledge sharing

	Mean	Std deviation	beta	t	Sig.
leadership	31.97	4.437	0.373	2.348	0.022

The regression analysis and ANOVA test was conducted to see the impact of leadership on knowledge sharing. The table above provides the t value being 2.348 and sig value is 0.022 which shows that leadership is having significance on knowledge sharing.

Hence, $H_0$15: There is no significant impact of leadership as a dimension of KM infrastructure on knowledge sharing is rejected and $H_1$15 is not rejected.

Hypothesis 16

$H_0$16: There is no significant impact of rewarding with incentives as a dimension of KM infrastructure on knowledge sharing.

$H_1$16: There is a significant impact of rewarding with incentives as a dimension of KM infrastructure on knowledge sharing.

Table 4.30: Spearman's rho correlation of rewarding with incentives on knowledge sharing

	rewarding with incentives	Sig.
knowledge sharing	0.587**	0.000
** Correlation is significant at 0.01 level (2 tailed)		

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient results as given in the above table were 0.587 that showed significance at 0.01 confidence level. A positive and direct relationship among rewarding with incentives and knowledge sharing is noted.

Table 4.31: ANOVA and Regression Analysis- rewarding with incentives and Knowledge sharing

	Mean	Std deviation	beta	t	Sig.
Rewarding with incentives	7.95	1.801	0.111	0.825	0.413

The regression analysis and ANOVA test was conducted to see the impact of rewarding with incentives on knowledge sharing. The table above provides the t value being 0.825 and sig value is 0.413 which shows that is not having significance on knowledge sharing.

Hence, $H_0$16: There is no significant impact of rewarding with incentives as a dimension of KM infrastructure on knowledge sharing is not rejected and $H_1$16 is rejected.

Hypothesis 17

$H_0$17: There is no significant impact of training and mentoring as a dimension of KM infrastructure on knowledge sharing.
$H_1$17: There is a significant impact of training and mentoring as a dimension of KM infrastructure on knowledge sharing.

Table 4.32: Spearman's rho correlation of training and mentoring on knowledge sharing

	training and mentoring	Sig.
knowledge sharing	0.619**	0.000
** Correlation is significant at 0.01 level (2 tailed)		

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient result as given in the above table was 0.619 that showed significance at 0.01 confidence level. A positive and direct relationship among training and mentoring and knowledge sharing is noted.

Table 4.33: ANOVA and Regression Analysis- Training and mentoring and Knowledge sharing

	Mean	Std deviation	Beta	t	Sig.
Training and mentoring	36.95	6.736	0.063	0.404	0.687

The regression analysis and ANOVA test was conducted to see the impact of training and rewarding on knowledge sharing. The table above provides the t value being 0.404 and sig value is 0.687 which shows that training and mentoring is not having significance on knowledge sharing.

Hence, $H_0$17: There is no significant impact of training and mentoring as a dimension of KM infrastructure on knowledge sharing is not rejected and $H_1$17 is rejected.

4.2.3 Impact of KM Strategy Dimensions on KM Process

Table 4.34: Spearman correlation coefficient of KM Strategy on KM process

	KM policy	KM plan	KM budget allocation	ICT investment
KM policy	1			
KM plan	.360**	1		
KM budget allocation	.295*	0.24	1	
ICT investment	.390**	.411**	.267*	1
Knowledge Acquisition and capture	0.124	0.236	0.217	0.151
Knowledge storage & preservation	.262*	0.241	0.156	0.213
Knowledge sharing	0.199	0.225	0.194	0.127
* Correlation is significant at 0.05 level (2 tailed)				
** Correlation is significant at 0.01 level (2 tailed)				

The above table shows the overall correlation of the KM Strategy dimensions with KM process dimensions. The correlation analysis shows no direct relationship among KM strategy with KM process dimensions.

The regression statistics which was done on the independent variables (Predictors: KM policy, KM plan, budget allocation and ICT investment) on the dependent variable of knowledge acquisition and capture. It revealed the overall goodness-of-fit measures as below:

R^2 = 0.09 that is 9% variation in the dependent variable which is explained by the independent variables. The ANOVA test depicted F=1.501 and sig value = 0.213.

The regression statistics which was done on the independent variables (Predictors: KM policy, KM plan, budget allocation and ICT investment)on the dependent variable of knowledge storage and preservation. It revealed the overall goodness-of-fit measures as below :

R^2 = 0.109 that is 10.9% variation in the dependent variable which is explained by the independent variables. The ANOVA test depicted F=1.857 and sig value = 0.000.

The regression statistics which was done on the independent variables (Predictors: culture, employee participation, leadership, rewarding with incentives and Training & mentoring) on the dependent variable of knowledge sharing. It revealed the overall goodness-of-fit measures as below :

R^2 = 0.08 that is 8.0% variation in the dependent variable which is explained by the independent variables. The ANOVA test depicted F=1.327 and sig value = 0.000.

Hypothesis 18

$H_0$18: There is no significant impact of KM policy as a dimension of KM Strategy on knowledge acquisition and capture.

$H_1$18: There is a significant impact of KM policy as a dimension of KM Strategy on knowledge acquisition and capture.

Table 4.35: Spearman's rho correlation of KM policy on knowledge acquisition and capture

	KM policy	Sig.
knowledge acquisition and capture	0.124	0.32

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient result as given in the above table was 0.124 that showed no significance. There is positive relationship among KM policy and knowledge acquisition and capture. is noted.

Table 4.36: ANOVA and Regression Analysis- KM policy on Knowledge acquisition and capture

	Mean	Std deviation	beta	t	Sig
KM policy	4.03	0.803	0.219	1.642	0.106

The regression analysis and ANOVA test was conducted to see the impact of KM policy on Knowledge acquisition and capture. The table above provides the t value

being 1.642 and sig value is 0.106 which shows that KM policy is not having significant impact on knowledge acquisition and capture

Hence, $H_0$18: There is no significant impact of KM policy as a dimension of KM Strategy on knowledge acquisition and capture is not rejected and $H_1$18 is rejected.

Hypothesis 19

$H_0$19: There is no significant impact of KM plan as a dimension of KM Strategy on knowledge acquisition and capture.

$H_1$19: There is a significant impact of KM plan as a dimension of KM Strategy on knowledge acquisition and capture.

Table 4.37: Spearman's rho correlation of KM plan on knowledge acquisition and capture

	KM plan	Sig.
knowledge acquisition and capture	0.236	0.056

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient result as given in the above table was 0.236 that showed no significance. There is relationship among KM plan and knowledge acquisition and capture but no significance is noted.

Table 4.38: ANOVA and Regression Analysis- KM plan on Knowledge acquisition and capture

	Mean	Std deviation	beta	t	Sig.
KM plan	4.03	0.822	0.112	0.833	0.408

The regression analysis and ANOVA test was conducted to see the impact of KM plan on Knowledge acquisition and capture. The table above provides the t value being 0.833 and sig value is 0.408 which shows that KM plan is not having significance on knowledge acquisition and capture

Hence, $H_0$19: There is no significant impact of KM plan as a dimension of KM Strategy on knowledge acquisition and capture is not rejected and $H_1$19 is rejected.

Hypothesis 20

$H_0$20: There is no significant impact of KM budget allocation as a dimension of KM Strategy on knowledge acquisition and capture.
$H_1$20: There is a significant impact of KM budget allocation as a dimension of KM Strategy on knowledge acquisition and capture.

Table 4.39: Spearman's rho correlation of KM budget allocation on knowledge acquisition and capture

	KM budget allocation	Sig.
knowledge acquisition and capture	0.217	0.08

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient result as given in the above table was 0.217 that showed no significance. There is relationship among KM budget allocation and knowledge acquisition and capture but not significant is noted.

Table 4.40: ANOVA and Regression Analysis- KM budget allocation on Knowledge acquisition and capture

	Mean	Std deviation	beta	t	Sig.
KM budget allocation	3.76	1.096	0	-0.003	0.998

The regression analysis and ANOVA test was conducted to see the impact of budget allocation on Knowledge acquisition and capture. The table above provides the t value being -0.003 and sig value is 0.998 which shows that KM budget allocation is not having significance on knowledge acquisition and capture

Hence, $H_0$20: There is no significant impact of KM budget allocation as a dimension of KM Strategy on knowledge acquisition and capture is not rejected and $H_1$20 is rejected.

Hypothesis 21

$H_0$21: There is no significant impact of ICT investment as a dimension of KM Strategy on knowledge acquisition and capture.

$H_1$21: There is a significant impact of ICT investment as a dimension of KM Strategy on knowledge acquisition and capture.

Table 4.41: Spearman's rho correlation of ICT investment on knowledge acquisition and capture

	ICT investment	Sig.
knowledge acquisition and capture	0.151	0.225

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient result as given in the above table was 0.151 that showed no significance. There is relationship among of ICT investment and knowledge acquisition and capture but no significance is noted.

Table 4.42: ANOVA and Regression Analysis- ICT investment on Knowledge acquisition and capture

	Mean	Std deviation	beta	t	Sig.
ICT investment	4	0.977	0.106	0.779	0.439

The regression analysis and ANOVA test was conducted to see the impact of ICT investment on Knowledge acquisition and capture. The table above provides the t value being 0.779 and sig value is 0.439 which shows that is not having significance on knowledge acquisition and capture

Hence, $H_0$21: There is no significant impact of ICT investment as a dimension of KM Strategy on knowledge acquisition and capture is not rejected and $H_1$21 is rejected.

Hypothesis 22

$H_0$22: There is no significant impact of KM policy as a dimension of KM Strategy on knowledge storing and preservation.

$H_1$22: There is a significant impact of KM policy as a dimension of KM Strategy on knowledge storing and preservation.

Table 4.43: Spearman's rho correlation of KM policy on knowledge storage & preservation

	KM policy	Sig.
knowledge storage & preservation	0.262*	0.034
*Correlation is significant at 0.05 level (2 tailed)		

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient result as given in the above table was 0.262 that showed significance. There is relationship among KM policy and knowledge storage & preservation.

Table 4.44: ANOVA and Regression Analysis- KM policy on Knowledge storage and preservation

	Mean	Std deviation	beta	t	Sig.
KM Policy	4.03	0.803	0.219	1.642	0.106

The regression analysis and ANOVA test was conducted to see the impact of KM policy on Knowledge storage and preservation. The table above provides the t value being 1.642 and sig value is 0.106 which shows that KM policy is not having significance on Knowledge storage and preservation.

Hence, $H_0$22: There is no significant impact of KM policy as a dimension of KM Strategy on knowledge storage & preservation is not rejected and $H_1$22 is rejected.

Hypothesis 23

$H_0$23: There is no significant impact of KM plan as a dimension of KM Strategy on knowledge storing and preservation.

$H_1$23: There is a significant impact of KM plan as a dimension of KM Strategy on knowledge storing and preservation.

Table 4.45: Spearman's rho correlation of KM plan on Knowledge storing and preservation

	KM plan	Sig.
knowledge storage and preservation	0.241	0.052

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient result as given in the above table was 0.241 that showed no significance. There is relationship among KM plan and knowledge storing and preservation is noted.

Table 4.46: ANOVA and Regression Analysis- KM plan on Knowledge storage and preservation

	Mean	Std deviation	beta	t	Sig.
KM plan	4.03	0.822	0.112	0.833	0.408

The regression analysis and ANOVA test was conducted to see the impact of KM plan on Knowledge storage and preservation. The table above provides the t value being 0.833 and sig value is 0.408 which shows that KM plan is not having significance on Knowledge storage and preservation.

Hence, $H_0$23: There is no significant impact of KM plan as a dimension of KM Strategy on knowledge storing and preservation is not rejected and $H_1$23 is rejected.

Hypothesis 24

$H_0$24: There is no significant impact of KM budget allocation as a dimension of KM Strategy on knowledge storing and preservation.

$H_1$24: There is a significant impact of KM budget allocation as a dimension of KM Strategy on knowledge storing and preservation.

Table 4.47: Spearman's rho correlation of KM budget allocation on knowledge storing and preservation

	KM budget allocation	Sig.
Knowledge storing and preservation.	0.156	0.21

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient result as given in the above table was 0.156 that showed no significance. There is correlation among KM budget allocation and Knowledge storing and preservation is noted.

Table 4.48: ANOVA and Regression Analysis- KM budget allocation on Knowledge storage and preservation

	Mean	Std deviation	Beta	t	Sig.
Budget allocation	3.76	1.096	0	-0.003	0.439

The regression analysis and ANOVA test was conducted to see the impact of KM budget allocation on Knowledge storage and preservation. The table above provides the t value being -0.003 and sig value is 0.439 which shows that KM budget allocation is not having significance on Knowledge storage and preservation.

Hence, $H_0$24: There is no significant impact of KM budget allocation as a dimension of KM Strategy on knowledge acquisition and capture is not rejected and $H_1$24 is rejected.

Hypothesis 25

$H_0$25: There is no significant impact of ICT investment as a dimension of KM Strategy on knowledge storage and preservation

$H_1$25: There is a significant impact of ICT investment as a dimension of KM Strategy on knowledge storage and preservation

Table 4.49: Spearman's rho correlation of ICT investment on knowledge storage and preservation

	ICT investment	Sig.
knowledge storage and preservation	0.213	0.086

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient result as given in the above table was 0.213 that showed no significance. There is relationship among of ICT investment and knowledge storage and preservation.

Table 4.50: ANOVA and Regression Analysis- ICT investment on Knowledge storage and preservation

	Mean	Std deviation	beta	t	Sig.
ICT investment	4	0.977	0.106	0.78	0.440

The regression analysis and ANOVA test was conducted to see the impact of ICT investment on Knowledge storage and preservation. The table above provides the t value being 0.78 and sig value is 0.440 which shows that ICT investment is not having significant impact on Knowledge storage and preservation.

Hence, $H_0$25: There is no significant impact of ICT investment as a dimension of KM Strategy on knowledge storage and preservation is not rejected and $H_1$25 is rejected.

Hypothesis 26

$H_0$26: There is no significant impact of KM policy as a dimension of KM Strategy on knowledge sharing.

$H_1$26: There is a significant impact of KM policy as a dimension of KM Strategy on knowledge sharing.

Table 4.51: Spearman's rho correlation of KM policy on knowledge sharing

	KM policy	Sig.
knowledge sharing	0.199	0.11

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient result as given in the above table was 0.199 that showed no significance. There is relationship among KM policy and knowledge sharing but not significant.

Table 4.52: ANOVA and Regression Analysis- KM policy on Knowledge sharing

	Mean	Std deviation	beta	t	Sig.
KM policy	4.03	0.803	0.223	1.645	0.105

The regression analysis and ANOVA test was conducted to see the impact of KM policy on Knowledge sharing. The table above provides the t value being 1.645 and sig value is 0.105 which shows that KM policy is not having significant impact on Knowledge sharing.

Hence, $H_0$26: There is no significant impact of KM policy as a dimension of KM Strategy on knowledge sharing is not rejected and $H_1$26 is rejected.

Hypothesis 27

$H_0$27: There is no significant impact of KM plan as a dimension of KM Strategy on knowledge sharing.

$H_1$27: There is a significant impact of KM plan as a dimension of KM Strategy on knowledge sharing.

Table 4.53: Spearman's rho correlation of KM plan on knowledge sharing

	KM plan	Sig.
Knowledge sharing	0.225	0.069

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient result as given in the above table was 0.225 that showed no significance. There is relationship among KM plan and knowledge sharing but not significant.

Table 4.54: ANOVA and Regression Analysis- KM plan on Knowledge sharing

	Mean	Std deviation	beta	t	Sig.
KM plan	4.03	0.822	0.113	0.826	0.412

The regression analysis and ANOVA test was conducted to see the impact of KM plan on Knowledge sharing. The table above provides the t value being 0.826 and sig value is 0.412 which shows that KM plan is not having significant impact on Knowledge storage and preservation.

Hence, $H_0$27: There is no significant impact of KM plan as a dimension of KM Strategy on knowledge sharing is not rejected and $H_1$27 is rejected.

Hypothesis 28

$H_0$28: There is no significant impact of KM budget allocation as a dimension of KM Strategy on knowledge Sharing.
$H_1$28: There is a significant impact of KM budget allocation as a dimension of KM Strategy on knowledge sharing.

Table 4.55: Spearman's rho correlation of KM budget allocation on knowledge sharing

	KM budget allocation	Sig.
knowledge sharing	0.194	0.119

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient result as given in the above table was 0.194 that showed no significance.

There is relationship among KM budget allocation and knowledge sharing but not significant.

Table 4.56: ANOVA and Regression Analysis- KM budget allocation on Knowledge sharing

	Mean	Std deviation	beta	t	Sig.
KM budget allocation	3.76	1.096	0.014	0.099	0.921

The regression analysis and ANOVA test was conducted to see the impact of KM budget allocation on Knowledge sharing. The table above provides the t value being 0.099 and sig value is 0.921 which shows that KM budget allocation is not having significance on Knowledge sharing.

Hence, $H_0$28: There is no significant impact of KM budget allocation as a dimension of KM Strategy on knowledge sharing is not rejected and $H_1$28 is rejected.

Hypothesis 29

$H_0$29: There is no significant impact of ICT investment as a dimension of KM Strategy on knowledge sharing.
$H_1$29: There is a significant impact of ICT investment as a dimension of KM Strategy on knowledge sharing.

Table 4.57: Spearman's rho correlation of ICT investment on knowledge sharing

	ICT investment	Sig.
knowledge sharing	0.127	0.309

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient result as given in the above table was 0.127 that showed no significance. There is relationship among of ICT investment and knowledge sharing.

Table 5.58: ANOVA and Regression Analysis- ICT investment on Knowledge sharing

	Mean	Std deviation	Beta	t	Sig.
ICT investment	4	0.977	-0.023	-0.165	0.87

The regression analysis and ANOVA test was conducted to see the impact of ICT investment on Knowledge sharing. The table above provides the t value being -0.165 and sig value is 0.87 which shows that ICT investment is not having significance on Knowledge sharing.

Hence, $H_0$29: There is no significant impact of ICT investment as a dimension of KM Strategy on knowledge sharing is not rejected and $H_1$29 is rejected.

4.2.4 Impact of ICT Infrastructure Dimensions on KM Process

Table 5.59: Spearman correlation of ICT infrastructure on KM process

	ICT facility	ICT usage
ICT facility	1	
ICT usage	.792**	1
Knowledge Acquisition and capture	.580**	.638**
Knowledge storage & preservation	.544**	.531**
Knowledge sharing	.637**	.675**

The above table shows the overall correlation of the ICT infrastructure dimensions with KM process dimensions. The correlation analysis shows a positive and direct relationship among ICT infrastructure with KM process dimensions.

The regression statistics which was done on the independent variables (Predictors: ICT facility, ICT usage) on the dependent variable of knowledge acquisition and capture. It revealed the overall goodness-of-fit measures as below:

R^2 = 0.445 that is 44.5% variation in the dependent variable which is explained by the independent variables. The ANOVA test depicted F=25.277 and sig value = 0.000.

The regression statistics which was done on the independent variables (Predictors: ICT facility, ICT usage)on the dependent variable of knowledge storage and preservation. It revealed the overall goodness-of-fit measures as below :
R^2 = 0.38 that is 38.0% variation in the dependent variable which is explained by the independent variables. The ANOVA test depicted F=19.275 and sig value = 0.000.

The regression statistics which was done on the independent variables (Predictors: ICT facility, ICT usage)on the dependent variable of knowledge sharing. It revealed the overall goodness-of-fit measures as below :
R^2 = 0.505 that is 50.5% variation in the dependent variable which is explained by the independent variables. The ANOVA test depicted F=32.128 and sig value = 0.000.

Hypothesis 30

$H_0$30: There is no significant impact of ICT facility as a dimension of ICT infrastructure on knowledge acquisition and capture.
$H_1$30: There is a significant impact of ICT facility as a dimension of ICT infrastructure on knowledge acquisition and capture.

Table 4.60: Spearman's rho correlation of ICT facility on knowledge acquisition and capture

	ICT facility	Sig.
knowledge acquisition and capture.	0.580**	0.000
**Correlation is significant at 0.01 level (2 tailed)		

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient result as given in the above table was 0.580 that showed significance at 0.01. There is a positive and direct relationship among of ICT facility and knowledge acquisition and capture..

Table 4.61: ANOVA and Regression Analysis- ICT facility on Knowledge acquisition and capture

	Mean	Std deviation	beta	t	Sig.
ICT facility	42.47	7.22	0.225	1.52	0.05

The regression analysis and ANOVA test was conducted to see the impact of ICT facility on Knowledge acquisition and capture. The table above provides the t value being 1.52 and sig value is 0.05 which shows that ICT facility is having significance impact on Knowledge acquisition and capture.

Hence, $H_0$30: There is no significant impact of ICT facility as a dimension of ICT infrastructure on knowledge acquisition and capture is rejected and $H_1$30 is not rejected.

Hypothesis 31

$H_0$31: There is no significant impact of ICT usage as a dimension of ICT infrastructure on knowledge acquisition and capture.
$H_1$31: There is a significant impact of ICT usage as a dimension of ICT infrastructure on knowledge acquisition and capture.

Table 4.62: Spearman's rho correlation of ICT usage on knowledge acquisition and capture

	ICT usage	Sig.
knowledge acquisition and capture.	0.638**	0.000
**Correlation is significant at 0.01 level (2 tailed)		

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient result as given in the above table was 0.638 that showed significance. There is a positive and direct relationship among of ICT usage and knowledge acquisition and capture.

Table 4.63: ANOVA and Regression Analysis- ICT usage on Knowledge acquisition and capture

	Mean	Std deviation	beta	t	Sig.
ICT usage	33.92	5.551	0.477	3.221	0.002

The regression analysis and ANOVA test was conducted to see the impact of ICT usage on Knowledge acquisition and capture. The table above provides the t value being 3.221 and sig value is 0.002 which shows that ICT usage is having significant impact on Knowledge acquisition and capture.

Hence, $H_0$31: There is no significant impact of ICT usage as a dimension of ICT infrastructure on knowledge acquisition and capture is rejected and $H_1$31 is not rejected.

Hypothesis 32

$H_0$32: There is no significant impact of ICT facility as a dimension of ICT infrastructure on knowledge storage and preservation

$H_1$32: There is a significant impact of ICT facility as a dimension of ICT infrastructure on knowledge storage and preservation

Table 4.64: Spearman's rho correlation of ICT facility on knowledge storage and preservation

	ICT facility	Sig.
Knowledge storage and preservation	0.544**	0.000
**Correlation is significant at 0.01 level (2 tailed)		

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient result as given in the above table was 0.544 that showed significance. There is a positive and direct relationship among of ICT facility and knowledge storage and preservation.

Table 4.65: ANOVA and Regression Analysis- ICT facility on Knowledge storage and preservation

	Mean	Std deviation	beta	t	Sig.
ICT facility	42.47	7.22	0.335	2.137	0.036

The regression analysis and ANOVA test was conducted to see the impact of ICT facility on Knowledge storage and preservation. The table above provides the t value being 2.137 and sig value is 0.036 which shows that ICT facility is having significant impact on Knowledge storage and preservation

Hence, $H_0$32: There is no significant impact of ICT facility as a dimension of ICT infrastructure on knowledge storage and preservation is rejected and $H_1$32 is not rejected.

Hypothesis 33

$H_0$33: There is no significant impact of ICT usage a dimension of ICT infrastructure on knowledge storage and preservation

$H_1$33: There is a significant impact of ICT usage as a dimension of ICT infrastructure on knowledge storage and preservation

Table 4.66: Spearman's rho correlation coefficient of ICT usage on knowledge storage and preservation

	ICT usage	Sig.
knowledge storage and preservation	0.531**	0.000
**Correlation is significant at 0.01 level (2 tailed)		

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient result as given in the above table was 0.531 that showed significance. There is a positive and direct relationship among of ICT usage and knowledge storage and preservation.

Table 4.67: ANOVA and Regression Analysis- ICT usage on Knowledge storage and preservation

	Mean	Std deviation	beta	t	Sig.
ICT usage	33.92	5.551	0.319	2.036	0.046

The regression analysis and ANOVA test was conducted to see the impact of ICT usage on Knowledge storage and preservation. The table above provides the t value being 2.036 and sig value is 0.046 which shows that ICT usage is having significant impact on Knowledge storage and preservation

Hence, $H_0$33: There is no significant impact of ICT usage as a dimension of ICT infrastructure on knowledge storage and preservation is rejected and $H_1$33 is not rejected.

Hypothesis 34

$H_0$34: There is no significant impact of ICT facility as a dimension of ICT infrastructure on knowledge sharing
$H_1$34: There is a significant impact of ICT facility as a dimension of ICT infrastructure on knowledge sharing

Table 4.68: Spearman's rho correlation coefficient of ICT facility on knowledge sharing

	ICT facility	Sig.
Knowledge sharing	0.637**	0.000
**Correlation is significant at 0.01 level (2 tailed)		

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient result as given in the above table was 0.637 that showed significance. There is a positive and direct relationship among of ICT facility and knowledge sharing.

Table 4.69: ANOVA and Regression Analysis- ICT facility on Knowledge sharing

	Mean	Std deviation	beta	t	Sig.
ICT facility	42.47	7.22	0.165	1.179	0.243

The regression analysis and ANOVA test was conducted to see the impact of ICT facility on Knowledge sharing. The table above provides the t value being 1.179 and sig value is 0.243 which shows that ICT facility not having significant impact on Knowledge sharing

Hence, $H_0$34: There is no significant impact of ICT facility as a dimension of ICT infrastructure on knowledge sharing is not rejected and $H_1$34 is rejected.

Hypothesis 35

$H_0$35: There is no significant impact of ICT usage as a dimension of ICT infrastructure on knowledge sharing
$H_1$35: There is a significant impact of ICT usage as a dimension of ICT infrastructure on knowledge sharing

Table 4.70: Spearman's rho correlation of ICT usage on knowledge sharing

	ICT usage	Sig.
Knowledge sharing	0.675**	0.000
**Correlation is significant at 0.01 level (2 tailed)		

Discussion: The researcher had applied spearman's rho correlation. The correlation coefficient result as given in the above table was 0.675 that showed significance at 0.01 confidence level. There is a positive and direct relationship among of ICT usage and knowledge sharing.

Table 4.71: ANOVA and Regression Analysis- ICT usage on Knowledge sharing

	Mean	Std deviation	beta	t	Sig.
ICT usage	33.92	5.551	0.575	4.108	0.000

The regression analysis and ANOVA test was conducted to see the impact of ICT usage on Knowledge sharing. The table above provides the t value being 4.108 and sig value is 0.000 which shows that ICT usage is having significant impact on Knowledge sharing

Hence, $H_0$35: There is no significant impact of ICT usage as a dimension of ICT infrastructure on knowledge sharing is rejected and $H_1$35 is not rejected.

4.2.5 Comparison of SMEs with Large on KM Infrastructure Dimensions

Hypothesis 36

$H_0$36: There is no significant difference on culture as a dimension of KM infrastructure among SMEs and large organizations.
$H_1$36: There is a significant difference on culture as a dimension of KM infrastructure among SMEs and large organizations.

Table 4.72: Culture dimensions among SME and large firms

KM infrastructure dimensions	Type of firm	N	Mean	Std. Deviation	t value	Sig.
Culture	SME	66	39.38	4.604	-3.002	0.004
	Large	13	43.38	3.042		

Discussion: The researcher has calculated the descriptive statistics and to compare the level of culture among SMEs and large firms the ANOVA-Levene's tests for equality of variances were applied for the variables.

The results are given in table which implied that culture in comparison with SMEs and Large were showing the sig values < 0.05 hence there is a significant difference in the mean value of culture among these groups.

Hence ***$H_0$36: There is no significant difference of culture as a dimension of KM infrastructure dimension among SMEs and large organizations is rejected and $H_1$36 is not rejected.***

Hypothesis 37

$H_0$37: There is no significant difference on employee participation as a dimension of KM infrastructure among SMEs and large organizations.
$H_1$37: There is a significant difference on employee participation as a dimension of KM infrastructure among SMEs and large organizations.

Table 4.73: Employee participation dimensions among SME and large

KM infrastructure dimensions	Type of firm	N	Mean	Std. Deviation	t value	Sig.
Employee participation	SME	66	49.36	5.582	-2.444	0.017
	Large	13	53.38	4.464		

Discussion: The researcher has calculated the descriptive statistics and to compare the level of Employee participation among SMEs and large firms, ANOVA-Levene's tests for equality of variances were applied for the variables.

The results are given in table which implied that employee participation in comparison with SMEs and Large were showing the sig values < 0.05 hence there is a significant difference in the mean value of Employee participation among these groups.

Hence $H_0$37: There is no significant difference of Employee participation as a dimension of KM infrastructure dimension among SMEs and large organizations is rejected and $H_1$37 is not rejected.

Hypothesis 38

$H_0$38: There is no significant difference on leadership as a dimension of KM infrastructure among SMEs and large organizations.
$H_1$38: There is a significant difference on leadership as a dimension of KM infrastructure among SMEs and large organizations.

Table 4.74: Leadership dimensions among SME and large

KM infrastructure dimensions	Type of firm	N	Mean	Std. Deviation	t value	Sig.
Leadership	SME	66	31.97	4.437	-2.766	0.007
	Large	13	35.46	2.106		

Discussion: The researcher has calculated the descriptive statistics and to compare the level of Leadership among SMEs and large firms, ANOVA-Levene's tests for equality of variances were applied for the variables.

The results are given in table which implied that leadership in comparison with SMEs and Large were showing the sig values < 0.05 hence there is a significant difference in the mean value of Leadership among these groups.

Hence, $H_0$38: There is no significant difference on leadership as a dimension of KM infrastructure among SMEs and large organizations is rejected and $H_1$38 is not rejected.

Hypothesis 39

$H_0$39: There is no significant difference on rewarding with incentives as a dimension of KM infrastructure among SMEs and large organizations.
$H_1$39: There is a significant difference on rewarding with incentives as a dimension of KM infrastructure among SMEs and large organizations.

Table 4.75: Rewarding with incentives dimensions among SME and large

KM infrastructure dimensions	Type of firm	N	Mean	Std. Deviation	t value	Sig.
Rewarding with incentives	SME	66	7.95	1.801	0.196	0.845
	Large	13	7.85	1.908		

Discussion: The researcher has calculated the descriptive statistics and to compare the level of Rewarding with incentives among SMEs and large firms, ANOVA-Levene's tests for equality of variances were applied for the variables.

The results are given in table which implied that Rewarding with incentives in comparison with SMEs and Large were showing the sig values < 0.05 hence there is no significant difference in the mean value of Rewarding with incentives among these groups.

Hence, $H_0$39: There is no significant difference on Rewarding with incentives as a dimension of KM infrastructure among SMEs and large organizations is not rejected and $H_1$39 is rejected.

Hypothesis 40

$H_0$40: There is no significant difference on training and mentoring as a dimension of KM infrastructure among SMEs and large organizations.
$H_1$40: There is a significant difference on training and mentoring as a dimension of KM infrastructure among SMEs and large organizations.

Table 4.76: Training and mentoring dimensions among SME and large

KM infrastructure dimensions	Type of firm	N	Mean	Std. Deviation	t value	Sig.
Training and mentoring	SME	66	36.95	6.736	-2.25	0.027
	Large	13	41.38	4.942		

Discussion: The researcher has calculated the descriptive statistics and to compare the level of Training and mentoring among SMEs and large firms, ANOVA-Levene's tests for equality of variances were applied for the variables.

The results are given in table which implied that Training and mentoring in comparison with SMEs and Large were showing the sig values < 0.05 hence there is a significant difference in the mean value of Training and mentoring among these groups.

Hence, $H_0$40: There is no significant difference on Training and mentoring as a dimension of KM infrastructure among SMEs and large organizations is rejected and $H_1$40 is not rejected.

4.2.6 Comparison of SMEs with Large on KM Strategy Dimensions

Hypothesis 41

$H_0$41: There is no significant difference of KM policy as a dimension of KM strategy among SMEs and large organizations.
$H_1$41: There is a significant difference of KM policy as a dimension of KM strategy among SMEs and large organizations.

Table 4.77: KM policy dimensions among SME and large

KM strategy dimensions	Type of firm	N	Mean	Std. Deviation	t value	Sig.
KM policy	SME	66	4.03	.803	-7.127	0.000
	Large	13	4.92	.277		

Discussion: The researcher has calculated the descriptive statistics and to compare the level of KM policy among SMEs and large firms the ANOVA-Levene's tests for equality of variances were applied for the variables.

The results are given in table which implied that KM policy in comparison with SMEs and Large were showing the sig values < 0.05 hence there is a significant difference in the mean value of KM policy among these groups.

Hence ***$H_0$41: There is no significant difference of KM policy as a dimension of KM strategy among SMEs and large organizations is rejected and $H_1$41 is not rejected.***

Hypothesis 42

$H_0$42: There is no significant difference of KM plan as a dimension of KM strategy among SMEs and large organizations.
$H_1$42: There is a significant difference of KM plan as a dimension of KM strategy among SMEs and large organizations.

Table 4.78: KM plan dimensions among SME and large

KM strategy dimensions	Type of firm	N	Mean	Std. Deviation	t value	Sig.
KM plan	SME	66	4.03	.822	-2.417	0.018
	Large	13	4.62	.650		

Discussion: The researcher has calculated the descriptive statistics and to compare the level of KM plan among SMEs and large firms the ANOVA-Levene's tests for equality of variances were applied for the variables.

The results are given in table which implied that KM plan in comparison with SMEs and Large were showing the sig values < 0.05 hence there is a significant difference in the mean value of KM plan among these groups.

Hence ***$H_0$42: There is no significant difference of KM plan as a dimension of KM strategy among SMEs and large organizations is rejected and $H_1$42 is not rejected.***

Hypothesis 43

$H_0$43: There is no significant difference of KM budget allocation as a dimension of KM strategy among SMEs and large organizations.

$H_1$43: There is a significant difference of KM budget allocation as a dimension of KM strategy among SMEs and large organizations.

Table 4.79: KM budget allocation dimensions among SME and large

KM strategy dimensions	Type of firm	N	Mean	Std. Deviation	t value	Sig.
KM budget allocation	SME	66	3.76	1.096	-2.504	0.014
	Large	13	4.54	.519		

Discussion: The researcher has calculated the descriptive statistics and to compare the level of KM budget allocation among SMEs and large firms the ANOVA-Levene's tests for equality of variances were applied for the variables.

The results are given in table which implied that KM budget allocation in comparison with SMEs and Large were showing the sig values < 0.05 hence there is a significant difference in the mean value of KM budget allocation among these groups.

Hence ***$H_0$43: There is no significant difference of KM budget allocation as a dimension of KM strategy among SMEs and large organizations is rejected and $H_1$43 is not rejected.***

Hypothesis 44

$H_0$44: There is no significant difference of ICT investment as a dimension of KM strategy among SMEs and large organizations.

$H_1$44: There is a significant difference of ICT investment as a dimension of KM strategy among SMEs and large organizations.

Table 4.80: ICT investment among SME and large

KM strategy dimensions	Type of firm	N	Mean	Std. Deviation	t value	Sig.
ICT investment	SME	66	4.00	.977	-2.774	0.007
	Large	13	4.77	.439		

Discussion: The researcher has calculated the descriptive statistics and to compare the level of ICT investment among SMEs and large firms the ANOVA-Levene's tests for equality of variances were applied for the variables.

The results are given in table which implied that ICT investment of KM in comparison with SMEs and Large were showing the sig values < 0.05 hence there is a significant difference in the mean value of ICT investment among these groups.

Hence ***$H_0$44: There is no significant difference of ICT investment as a dimension of KM strategy among SMEs and large organizations is rejected and $H_1$44 is not rejected.***

4.2.7 Comparison of SMEs with Large on KM Process Dimensions

Hypothesis 45

$H_0$45: There is no significant difference of knowledge acquisition and capture as a dimension of KM Process among SMEs and large organizations.
$H_1$45: There is a significant difference of knowledge acquisition and capture of KM Process among SMEs and large organizations.

Table 4.81: Knowledge acquisition and capture dimensions among SME and large

KM Process Dimensions	Type of firm	N	Mean	Std. Deviation	t value	Sig.
knowledge acquisition and capture	SME	66	40.24	7.6	-4.669	0.000
	Large	13	46.31	3.25		

Discussion: The researcher has calculated the descriptive statistics and to compare the level of knowledge acquisition and capture among SMEs and large firms, ANOVA-Levene's tests for equality of variances were applied for the variables.

The results are given in table which implied that knowledge acquisition and capture in comparison with SMEs and Large were showing the sig values < 0.05 hence there is a significant difference in the mean value of knowledge acquisition and capture among these groups.

Hence, $H_0$45: There is no significant difference on knowledge acquisition and capture as a dimension of KM Process among SMEs and large organizations is rejected and $H_1$45 is not rejected.

Hypothesis 46

$H_0$46: There is no significant difference of knowledge storage and preservation as a dimension of KM process among SMEs and large organizations.
$H_1$46: There is a significant difference of knowledge storage and preservation as a dimension of KM process among SMEs and large organizations.

Table 4.82: Knowledge storage and preservation dimensions among SME and large

KM Process dimensions	Type of firm	N	Mean	Std. Deviation	t value	Sig.
knowledge storage and preservation	SME	66	29.47	5.603	-4.516	0.000
	Large	13	36.77	3.468		

Discussion: The researcher has calculated the descriptive statistics and to compare the level of knowledge storage and preservation among SMEs and large firms, ANOVA-Levene's tests for equality of variances were applied for the variables.

The results are given in table which implied that knowledge storage and preservation in comparison with SMEs and Large were showing the sig values < 0.05 hence there

is a significant difference in the mean value of knowledge storage and preservation among these groups.

Hence, $H_0$46: There is no significant difference on knowledge storage and preservation as a dimension of KM Process among SMEs and large organizations is rejected and $H_1$46 is not rejected.

Hypothesis 47

$H_0$47: There is no significant difference of knowledge sharing as a dimension of KM process among SMEs and large organizations.
$H_1$47: There is a significant difference of knowledge sharing as a dimension of KM process among SMEs and large organizations.

Table 4.83: Knowledge sharing dimensions among SME and large

KM Process dimensions	Type of firm	N	Mean	Std. Deviation	t value	Sig.
knowledge sharing	SME	66	65.8	10.679	-2.196	0.031
	Large	13	72.62	7.263		

Discussion: The researcher has calculated the descriptive statistics and to compare the level of knowledge sharing among SMEs and large firms, ANOVA-Levene's tests for equality of variances were applied for the variables.

The results are given in table which implied that knowledge sharing in comparison with SMEs and Large were showing the sig values < 0.05 hence there is a significant difference in the mean value of knowledge sharing among these groups.

Hence, $H_0$47: There is no significant difference on knowledge sharing as a dimension of KM Process among SMEs and large organizations is rejected and $H_1$47 is not rejected.

4.2.8 Comparison of SMEs with Large on ICT Infrastructure Dimensions

Hypothesis 48

$H_0$48: There is no significant difference of ICT facility as a dimension of ICT infrastructure among SMEs and large organizations.
$H_1$48: There is a significant difference of ICT facility as a dimension of ICT infrastructure among SMEs and large organizations.

Table 4.84: ICT facility dimensions among SME and large

ICT infrastructure Dimensions	Type of firm	N	Mean	Std. Deviation	t value	Sig.
ICT facility	SME	66	42.47	7.22	-4.695	0.000
	Large	13	48.69	3.545		

Discussion: The researcher has calculated the descriptive statistics and to compare the level of ICT facility among SMEs and large firms, ANOVA-Levene's tests for equality of variances were applied for the variables.

The results are given in table which implied that ICT facility in comparison with SMEs and Large were showing the sig values < 0.05 hence there is a significant difference in the mean value of ICT facility among these groups.

Hence, $H_0$48: There is no significant difference on ICT facility as a dimension of ICT infrastructure among SMEs and large organizations is rejected and $H_1$48 is not rejected.

Hypothesis 49

$H_0$49: There is no significant difference of ICT usage as a dimension of ICT infrastructure among SMEs and large organizations.

$H_1$49: There is a significant difference of ICT usage as a dimension of ICT infrastructure among SMEs and large organizations.

Table 4.85: ICT usage dimensions among SME and large

ICT infrastructure Dimensions	Type of firm	N	Mean	Std. Deviation	t value	Sig (p)
ICT usage	SME	66	33.92	5.551	-8.73	0.000
	Large	13	41.31	1.797		

Discussion: The researcher has calculated the descriptive statistics and to compare the level of ICT usage among SMEs and large firms, ANOVA-Levene's tests for equality of variances were applied for the variables. The results are given in table which implied that ICT usage in comparison with SMEs and Large were showing the sig values < 0.05 hence there is a significant difference in the mean value of ICT usage among these groups.

Hence, $H_0$49: There is no significant difference on ICT usage as a dimension of ICT infrastructure among SMEs and large organizations is rejected and $H_1$49 is accepted.

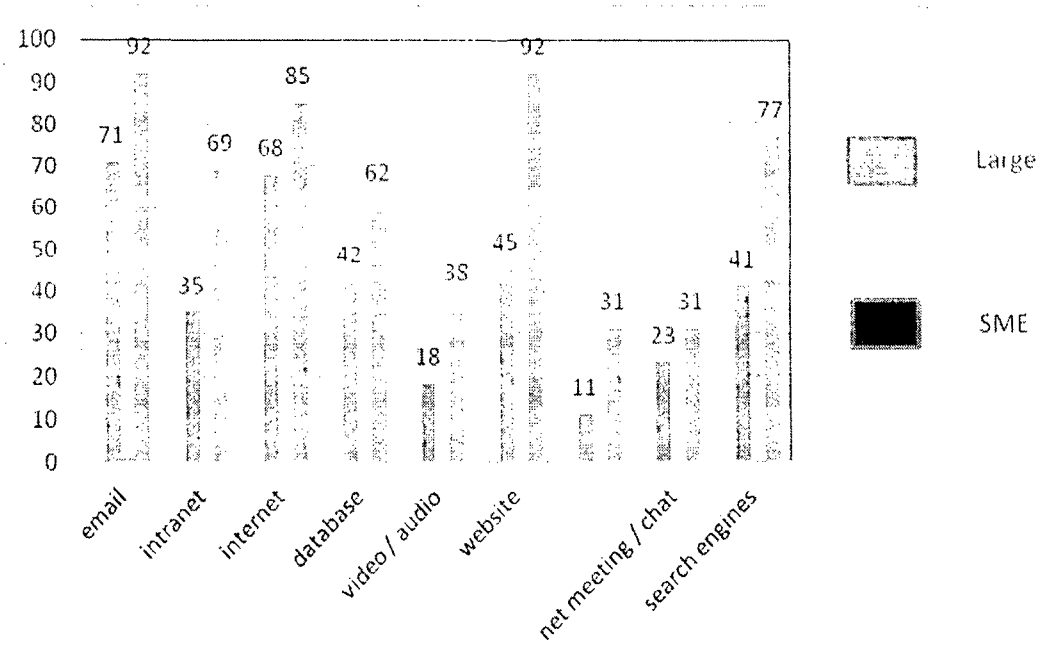

Figure 4.1: ICT Infrastructure deployed in SME and Large auto component firms

4.3 Summary of Hypothesis Testing

Table 4.86: Summary of Hypothesis Testing

S.No	*Hypotheses*	*F/t value*	*Sig*	*Results*
	KM Dimensions across Management Levels			
$H_0$1: There is no significant difference in KM practices being practiced between high and low responses of strategic levels of SMEs				
	organizational benefits of KM	2.768	0.007	Rejected
	Top priority to KM	3.687	0.003	Rejected
	KM Value system	3.388	0.001	Rejected
	Strategic partnerships	4.245	0.000	Rejected
	KM initiatives	4.176	0.001	Rejected
	Reward systems	6.201	0.000	Rejected
$H_0$2: There is no significant difference in KM practices being practiced between high and low responses of operational levels of SMEs.				
	KM infrastructure Dimensions			
	Culture	6.188	0.000	Rejected
	Employee Participation	7.326	0.000	Rejected
	Leadership	5.170	0.000	Rejected
	Rewarding with incentives	5.681	0.000	Rejected
	Training & mentoring	6.070	0.000	Rejected

KM Process Dimensions				
	Knowledge Acquisition and capture	7.579	0.000	Rejected
	Knowledge Storage and preservation	7.685	0.000	Rejected
	Knowledge Sharing	7.089	0.000	Rejected
Impact of KM Infrastructure Dimensions on KM Process				
3	There is no significant impact of culture as a dimension of KM infrastructure on knowledge acquisition and capture.	-0.377	0.707	Not rejected
4	There is no significant impact of employee participation as a dimension of KM infrastructure on knowledge acquisition and capture.	1.291	0.202	Not rejected
5	There is no significant impact of leadership as a dimension of KM infrastructure on knowledge acquisition and capture.	0.831	0.409	Not rejected
6	There is no significant impact of rewarding with incentives as a dimension of KM infrastructure on knowledge acquisition and capture	0.476	0.636	Not rejected
7	There is no significant impact of training and mentoring as a dimension of KM infrastructure on knowledge acquisition and capture	1.700	0.04	Rejected
8	There is no significant impact of culture as a dimension of KM infrastructure on knowledge storage and preservation.	0.039	0.969	Not rejected
9	There is no significant impact of employee participation as a dimension of KM infrastructure on knowledge storage and preservation.	2.159	0.035	Rejected
10	There is no significant impact of leadership as a dimension of KM infrastructure on knowledge storage and preservation.	1.504	0.138	Not rejected
11	There is no significant impact of rewarding with incentives as a dimension of KM infrastructure on knowledge storage and preservation.	-0.036	0.972	Not rejected
12	There is no significant impact of training and mentoring as a dimension of KM infrastructure on knowledge storage and preservation.	0.936	0.353	Not rejected
13	There is no significant impact of culture as a dimension of KM infrastructure on knowledge sharing.	0.114	0.91	Not rejected
14	There is no significant impact of employee participation as a dimension of KM infrastructure on knowledge sharing.	2.008	0.049	Rejected
15	There is no significant impact of leadership as a dimension of KM infrastructure on knowledge sharing.	2.348	0.022	Rejected
16	There is no significant impact of rewarding with incentives as a dimension of KM infrastructure on knowledge sharing.	0.825	0.413	Not rejected
17	There is no significant impact of training and mentoring as a dimension of KM infrastructure on knowledge sharing.	0.404	0.687	Not rejected
Impact of KM Strategy Dimensions on KM Process				
18	There is no significant impact of KM policy as a dimension of KM Strategy on knowledge acquisition and capture.	1.642	0.106	Not rejected
19	There is no significant impact of KM plan as a dimension of KM Strategy on knowledge acquisition and capture.	0.833	0.408	Not rejected
20	There is no significant impact of KM budget allocation as a dimension of KM Strategy on knowledge acquisition and capture.	-0.003	0.998	Not rejected

21	There is no significant impact of ICT investment as a dimension of KM Strategy on knowledge acquisition and capture.	0.779	0.439	Not rejected
22	There is no significant impact of KM policy as a dimension of KM Strategy on knowledge storing and preservation.	1.642	0.106	Not rejected
23	There is no significant impact of KM plan as a dimension of KM Strategy on knowledge storing and preservation.	0.833	0.408	Not rejected
24	There is no significant impact of KM budget allocation as a dimension of KM Strategy on knowledge storing and preservation.	-0.003	0.439	Not rejected
25	There is no significant impact of ICT investment as a dimension of KM Strategy on knowledge storing and preservation.	0.780	0.440	Not rejected
26	There is no significant impact of KM policy as a dimension of KM Strategy on knowledge sharing.	1.645	0.105	Not rejected
27	There is no significant impact of KM plan as a dimension of KM Strategy on knowledge sharing.	0.826	0.412	Not rejected
28	There is no significant impact of KM budget allocation as a dimension of KM Strategy on knowledge Sharing.	0.099	0.921	Not rejected
29	There is no significant impact of ICT investment as a dimension of KM Strategy on knowledge sharing.	-0.165	0.870	Not rejected
Impact of ICT Infrastructure Dimensions on KM Process				
30	There is no significant impact of ICT facility as a dimension of ICT infrastructure on knowledge acquisition and capture.	1.520	0.050	Rejected
31	There is no significant impact of ICT usage as a dimension of ICT infrastructure on knowledge acquisition and capture.	3.221	0.002	Rejected
32	There is no significant impact of ICT facility as a dimension of ICT infrastructure on knowledge storage and preservation	2.137	0.036	Rejected
33	There is no significant impact of ICT usage a dimension of ICT infrastructure on knowledge storage and preservation	2.036	0.046	Rejected
34	There is no significant impact of ICT facility as a dimension of ICT infrastructure on knowledge sharing	1.179	0.243	Not Rejected
35	There is no significant impact of ICT usage as a dimension of ICT infrastructure on knowledge sharing	4.108	0.000	Rejected
Comparison of SMEs with Large on KM Infrastructure Dimensions				
36	There is no significant difference on culture as a dimension of KM infrastructure among SMEs and large organizations.	-3.002	0.004	Rejected
37	There is no significant difference on employee participation as a dimension of KM infrastructure among SMEs and large organizations.	-2.444	0.017	Rejected
38	There is no significant difference on leadership as a dimension of KM infrastructure among SMEs and large organizations.	-2.766	0.007	Rejected
39	There is no significant difference on rewarding with incentives as a dimension of KM infrastructure among SMEs and large organizations	0.196	0.845	Not Rejected
40	There is no significant difference on training and mentoring as a dimension of KM infrastructure among SMEs and large organizations.	-2.25	0.027	Rejected

Comparison of SMEs with Large on KM Strategy Dimensions				
41	There is no significant difference of KM policy as a dimension of KM strategy among SMEs and large organizations.	-7.127	0.000	Rejected
42	There is no significant difference of KM plan as a dimension of KM strategy among SMEs and large organizations.	-2.417	0.018	Rejected
43	There is no significant difference of KM budget allocation as a dimension of KM strategy among SMEs and large organizations.	-2.504	0,014	Rejected
44	There is no significant difference of ICT investment as a dimension of KM strategy among SMEs and large organizations.	-2.774	0.007	Rejected
Comparison of SMEs with Large on KM Process Dimensions				
45	There is a no significant difference of knowledge acquisition and capture of KM Process among SMEs and large organizations.	-4.669	0.000	Rejected
46	There is no significant difference of knowledge storage and preservation as a dimension of KM process among SMEs and large organizations.	-4.516	0.000	Rejected
47	There is no significant difference of knowledge sharing as a dimension of KM process among SMEs and large organizations.	-2.195	0.031	Rejected
Comparison of SMEs with Large on ICT Infrastructure Dimensions				
48	There is no significant difference of ICT facility as a dimension of ICT infrastructure among SMEs and large organizations.	-4.695	0.000	Rejected
49	There is no significant difference of ICT usage as a dimension of ICT infrastructure among SMEs and large organizations.	-8.730	0.000	Rejected

Hypothesis testing helped to understand relative difference of KM Practices in the different levels of management. It has also given a clear understanding of impact of the various KM dimensions such as KM strategy, KM infrastructure, and ICT infrastructure to KM process in SMEs. A comparison of SMEs with large auto component firms has also depicted some of the relevant points which are listed below:

Among the Strategic level,

- There is significant difference in KM practices being practiced between high and low responses of strategic levels of SMEs pertaining to KM variables such as organizational benefits of KM, top priority to KM, value system of KM, Strategic partnerships used by SMEs, KM initiatives, and rewarding system that are planned at Strategic level.

Among the Operational level,

- There is significant difference in KM practices being practiced between high and low responses of operational levels of SMEs. KM infrastructure dimensions like culture, employee participation, leadership, rewarding with incentives, training and mentoring practices implemented at this level of management are having significance. KM process dimensions such as Knowledge acquisition and capture, knowledge storing and preservation and knowledge sharing are showing a significant difference in the process of KM being followed at this level.
- There is a significant impact of training and mentoring on knowledge acquisition and capture. Rest of the KM infrastructure dimensions like culture, employee participation, leadership and rewarding with incentives are not having significant impact on Knowledge acquisition and capture.
- There is a significant impact of employee participation on knowledge storage and preservation. Rest of the KM infrastructure dimensions like culture, leadership and rewarding with incentives and training and mentoring systems are not having significant impact on knowledge storage and preservation process.
- There is a significant impact of employee participation and leadership on knowledge sharing. Rest of the KM infrastructure dimensions like culture, rewarding with incentives and training and mentoring systems are not having impact on knowledge sharing process.
- There is no significant impact of KM strategy such as KM policy, KM Plan, KM budget allocation and ICT investment on any of the KM process components – Knowledge acquisition and capture, Knowledge storing and preservation and Knowledge sharing process at SMEs.
- There is a significant impact of ICT facility and ICT usage on Knowledge acquisition and capture and Knowledge storing and preservation process of KM.
- There is a significant impact of ICT usage on knowledge sharing process.
- ICT facility is not having impact on knowledge sharing.

In comparison of SMEs and large auto component firms,

- There is a significant difference of culture, employee participation, leadership and training and mentoring practices adopted.
- There is no difference in rewarding schemes adopted among large and SMEs.
- There is a difference in KM strategies that are followed in SMEs and large. KM policy, KM plan KM budget allocation and ICT investment are the KM strategies which are different in comparison among these auto component firms.
- A KM process which includes knowledge acquisition and capture, knowledge storing and preservation and knowledge sharing adopted is different among SMEs and large firms.
- ICT facility and its usage show a significant difference among SMEs and large organizations.

4.4 Chapter Summary

The hypotheses relating to various dimensions of KM infrastructure, KM process, ICT infrastructure and KM strategy dimensions were tested. The results reveal significant differences and impacts with respect to certain aspects. Hypotheses assessing the relative impact of independent variable on the dependent variables were also tested and discussed in this chapter. Next Chapter reveals the Findings, recommendations, implications to the industries and the Scope for the future research work.

Chapter 5

FINDINGS, IMPLICATIONS AND SCOPE OF THE FUTURE RESEARCH

Chapter 5

FINDINGS, RECOMMENDATIONS, IMPLICATIONS AND SCOPE OF THE FUTURE RESEARCH

5.1 Introduction

This chapter describes the key findings based on the results of the hypothesis testing and those results which have been got out of the statistical analysis. Recommendations and implications especially to the auto component SMEs have also been discussed. Lastly the directions for future research have been presented.

5.2 Key Findings

The following are the key findings that were inferred from this research study with respect to the auto component firms:

Findings - KM infrastructure at Strategic Level of SMEs

Table 5.1: Findings - Strategic Level of SMEs

S.No	Findings of this research	Correlation with previous study	Explanation
1	At the strategic level, KM benefits are understandable to executives. Executives agree and feel that KM has to be accorded top priority. Top executives in SMEs desire to promote knowledge sharing as a value system. Executives believe that strategic partnerships facilitate knowledge acquisition and they are committed for KM initiatives.	***Wong and Aspinwall (2005).*** ***(Martensson, 2000; Manasco, 1996; Truch, 2001; Jarrar, 2002; Sharp, 2003; Davenport et al., 1998).***	Top Management support is one among the eleven critical success factors for implementing KM in SME. Wong and Aspinwall (2005). Support and commitment from senior management is critical to a KM initiative (Martensson, 2000; Manasco, 1996; Truch, 2001; Jarrar, 2002; Sharp, 2003; Davenport et al., 1998).

Findings - KM infrastructure at Operational Level of SMEs

Table 5.2: Findings - KM infrastructure at Operational Level of SMEs

S.No	Findings of this research	Correlation with previous study	Explanation
2	KM infrastructure dimensions such as culture, employee participation, leadership, rewarding with incentives and training and mentoring are significantly different among the high and low responses of operational levels in SMEs.	***Wong and Elaine Aspinwall (2005).***	They have identified eleven (11) critical success factors for KM adoption in SME sector. This survey was done in all sectors of SMEs of UK. The critical success factors were ranked as follows: **leadership** and support, **culture**, strategy and purpose, resources, processes and activities, **training and education**, human resource management, information technology, **motivational aids**, organizational infrastructure and measurement.

Findings - KM Process at operational level of SMEs

Table 5.3: Findings - KM Process at Operational Level of SMEs

S.No	Findings of this research	Correlation with previous study	Explanation
3	KM Process such as knowledge acquisition and capture, knowledge storage and preservation and knowledge sharing are having significant differences among the high and low response rates of operational level in SMEs.	***Gold, Malhotra, and Segars (2001) - effectiveness model.***	He defined the Knowledge process capability as the integration of knowledge processes into the organization, and is operational by acquisition, (the capturing of knowledge), conversion (making captured knowledge available), application (degree to which knowledge is useful), & protection (security of the knowledge). This model proved that process capabilities and the performance variable were positive and of high magnitude.

Findings - Impact of KM infrastructure dimensions on KM Process

Table 5.4: Findings - Impact of KM infrastructure dimensions on KM Process

S.No	Findings of this research	Correlation with previous study	Explanation
4	**Knowledge Acquisition and Capture Process** Culture, Employee participation, Leadership and rewarding with incentives have no impact but Training and mentoring has more impact on Knowledge acquisition and capture.	***The findings are partly consistent with Lee and Choi (2003) and*** ***(Gold, Malhotra, and Segars, 2001).*** ***Rests of the dimensions are not correlating with previous study.***	Lee and Choi (2003) indicated that the organizational culture variable is essential for knowledge creation. The study focused only on relatively large and profitable firms, and hence insisted that the results may differ in small firms. The ability to acquire knowledge is, however, partly based on an organization's absorptive capacity (Gold, Malhotra, and Segars, 2001).
5	**Knowledge Storage and Preservation Process** Employee participation has more impact on knowledge storage and preservation. Culture, leadership, Rewarding with incentives and training and mentoring for employees has low impact on knowledge storage and preservation.	***Delong and Fahey (2000)*** ***Rests of the dimensions are not correlating with previous study.***	Collaboration and social interaction are the factors which is indicative of employee participation in an organization. Delong and Fahey (2000) cited interactivity, collaboration, sharing and teaching, shaping social interaction in the context of knowledge management.
6	**Knowledge Sharing Process** Leadership role and employee participation initiatives by the employees have a larger impact on knowledge sharing and Culture, rewarding with incentives, and training and mentoring has no impact on knowledge sharing.	***Oliver and Kandadi, (2006).*** ***Smith and Rupp (2002)*** ***Al-Alawi et al. (2007)*** ***Rests of the dimensions are not correlating with previous study.***	Leadership has positive impact on knowledge sharing. Oliver and Kandadi, (2006). Smith and Rupp (2002) also revealed that interaction between co-workers is fundamental in encouraging knowledge sharing. Similarly, Al-Alawi et al. (2007) found that communication among staff is positively related to knowledge sharing in organizations.

Findings - Impact of KM Strategy dimensions on KM Process

Table 5.5: Findings - Impact of KM Strategy dimensions on KM Process

S.No	Findings of this research	Correlation with previous study	Explanation
7	There is no impact of KM strategy such as KM policy, KM plan, KM budget allocation and ICT investment on the KM process dimensions such as Knowledge acquisition and capture, Knowledge storing and preservation and knowledge sharing.	***No correlation with the previous studies.***	One of the means for driving the success of KM is to have a clear and well-planned strategy (Liebowitz, 1999). Keskin (2005) conducted an empirical study on the relationship between knowledge management strategy and firm performance. His studies prove KM strategies have positive effects on firm performance. Since the findings do not correlate with the studies, it proves that SMEs have poor strategy for KM. SMEs are not having a unique and systematic way of implementing knowledge management process.

Findings - Impact of ICT infrastructure dimensions on KM Process

Table 5.6: Findings - Impact of ICT infrastructure dimensions on KM Process

S.No	Findings of this research	Correlation with previous study	Explanation
8	ICT infrastructure facility and its usage has an impact on knowledge acquisition process and knowledge storage and preservation process but not on knowledge sharing	***Mohamed Khalifa and Vanessa Liu (2003)*** ***Wong (2005)*** ***Park (2006)***	According to Wong (2005), information technology is a critical success factor of SMEs. Mohamed Khalifa and Vanessa Liu (2003) tested the role of information technology (IT) in relation to other important KM infrastructural capabilities and to KM process capabilities. The results were positive. Park (2006) conducted an empirical study examining the link among KM enablers (infrastructure capability), KM process capability, and knowledge management performance. Findings of this study include technology was a significant positive explanatory variable of knowledge acquisition, knowledge conversion, and protection.

Findings - Comparison of SMEs with Large on KM Infrastructure Dimensions

Table 5.7: Comparison on KM Infrastructure dimensions

S.No	Findings of this research	Correlation with previous study	Explanation
9	**Culture** In comparison of Large and SME auto component firms, a difference in culture is noted.	***Ghobadian and Gallear (1997) and*** ***Yusof and Aspinwall (2000)***	Culture at SMEs are more fluidic and organic rather than large organizations by Ghobadian and Gallear (1997). According to Yusof and Aspinwall (2000), A owner-manager who is both dictatorial and not committed can be problematic when implementing new initiatives. The owner has less trust on his employees or does not encourage the culture of sharing and transferring knowledge. Hence cultural difference is noted in SME and Large organizations.
10	**Employee participation** In comparison of Large and SME auto component firms, there is a difference in participation of employees.	***Axland (1992)*** ***Kuan Yew Wong and Elaine Aspinwall (2004)***	Collaboration is easy in SMEs due to few employees and better for KM change initiatives but SMEs have low degree of specialization and formalization which resist KM. This shows employee participation differs among SME and large firms.
11	**Leadership** Leadership initiatives for KM are different among Large and SMEs.	***Holsapple and Joshi, 2000***	Leaders establish the necessary conditions for effective KM (Holsapple and Joshi, 2000) which is obviously seen in large firms rather than less in SMEs. In SMEs, it becomes difficult for the owner to recognize the need for change. Since the owners are the leaders, it is up to them to either promote or hamper the KM process due to authoritative style of leadership.

12	**Rewarding with incentives** Rewarding with incentives are not significant among large and SMEs	***Not consistent with the previous studies.***	(Al-Alawi et al.,2007; Syed-Ikhsan and Rowland, 2004; Davenport and Prusak, 2000; Gupta and Govindarajan, 2000) argue that rewarding system is important for KM. Results of this study show that rewarding system is not promoting KM in auto component SMEs and large organizations.
13	**Training and Mentoring** Training and Mentoring are different among Large and SMEs.	***Matlay(2000a, 1997)*** ***Rajesh K. Pilliania 2008***	Most of the SMEs rely more on informal learning programs due to their lack of resources. As Matlay(2000a, 1997) stated, learning in this type of firm is mostly incidental and reactive rather big firms. The requirements and resources of SMEs are different from big firms as by Rajesh K. Pilliania (2008). SME does not have a systematic planning for training activities. It happens as and when there is a need for it and training is not in consistent and continuous way. Barber et al (1989) mentioned that levels of training tend to grow as firms grow and that smaller firms tend to perform training informally. In SME, there is no full time mentor to groom the employees. SMEs invest less in employee training as they do not have much funds and budgets to spend on such activity compared to large.

Findings - Comparison of SMEs with Large on KM Strategy Dimensions

Table 5.8: Comparison of SMs with Large on KM Strategy dimensions

S.No	Findings of this research	Correlation with previous study	Explanation
14	There is a difference in KM policy, KM plan, budget allocation and ICT investment Strategy of Large and SME organizations	***Rajesh K. Pilliana (2008).***	According to Rajesh K. Pilliana (2008), a well-developed and aligned KM strategy is the key strategic issue of KM. The studies on KM strategy mainly focused on big firms but the requirements and resources of SMEs are different from big firms. Consequently, KM practices are different in SMEs as compared to big firms.

Findings - Comparison of SMEs with Large on KM Process Dimensions

Table 5.9: Comparison of SMs with Large on KM Process dimensions

S.No	Findings of this research	Correlation with previous study	Explanation
15	**Knowledge acquisition and capture** There is a difference in Knowledge acquisition and capture among SME and large firms	*Mc Adam & Reid (2001)*	Construction of new knowledge in SMEs is less advanced but can be easy and simple than in large organizations according to Mc Adam & Reid (2001).
16	**Knowledge storage and preservation** There is a difference in Knowledge storage & preservation among SME and large firms	*Desouza and Awazu (2006)*	In SMEs there is lack of explicit knowledge repositories. Instead, each manager/owner acts as the knowledge repository. More verbal communication happens hence due to lack of resources they do not focus much on storing and preservation of knowledge which does not happen in large firms. SMEs do not manage knowledge in similar fashions as larger organizations.

17	**Knowledge sharing** There is a difference in Knowledge sharing among SME and large firms	*Desouza and Awazu (2006)* *Jonathan Staplehurst (2010)*	Desouza and Awazu (2006), SMEs share tacit knowledge rather explicit by large organizations. Due to lack of knowledge sharing systems, knowledge is related to an organization's core competencies and held as tacit knowledge in the minds of key employees; so SMEs are very sensitive to the loss of employees (Lim & Klobas 2000) Job roles and facilities are entirely different for SMEs and large that makes a difference in knowledge sharing. (Jonathan Staplehurst 2010).

Findings - Comparison of SMEs with Large on ICT Infrastructure Dimensions

Table 5.10: Comparison of SMs with Large on ICT infrastructure dimensions

18	ICT Infrastructure There is a difference in ICT facility and usage among SME and large firms.	*Desouza and Awazu (2006)*	Lees and Lees (1987) stated that small firms do not undertake adequate planning for their use and operation of IT. Bergeron and Raymond (1992) argued that IT can be used as a strategic weapon by small firms to maintain their competitiveness and attain a favorable position. Small firms depend on external IT expertise in the form of consultants and vendors (Thong *et al.* 1994). SMEs knowingly or unknowingly, manage knowledge in the humanistic way. The use of technology in an SME is mostly limited to acts of automation. Knowledge is created, shared, transferred, and applied via people based mechanisms rather technology plays a vital role in managing knowledge in large firms due to good facility and resources.

5.3 Recommendations

- ***KM Strategy:*** A KM strategy could lead to a systematic implementation of KM process at the operational level of management in order to yield a better performance. (Liebowitz, 1999; O'Dell et al., 1999; Soliman and Spooner, 2000). Auto component SMEs should understand the importance and benefits of framing KM strategies and should put a KM strategy in right place.

- ***Change Initiative:*** SMEs consist of a small number of employees. As such it is easier to get the employees at one place at one time, easier to have one pattern of behavior and thought process, and therefore easier to initiate any change. Therefore any change especially in KM can be easier to bring about and weave into the cultural fabric of the organization. (Ghobadian and Gallear, 1997)
- ***Training and Development Opportunities:*** The employee should be developed by providing systematic and continuous planning for training opportunities. This in the long run would improve and enhance the personal value of individuals and also help them in creating explicit knowledge repository and develop a nature of better knowledge sharing. This would also equip them with the skills to foster creativity, innovation, and knowledge sharing. (Yahya and Goh, 2002)
- ***Owner-Leader:*** The owner of the SME is the leader and therefore the owner is in a strong position to control the behavior of all employees. Success of KM depends on the owner / manager personal interest and therefore he should initiate at his end to promote a KM culture which is most lacking in SMEs.

- ***Authoritative style of leadership:*** High focus is given to core operational activities in SMEs and no time to think about the strategic issues. Since the owners are the leaders, it is up to them to either promote or hamper the KM process due to authoritative style of leadership. (Yusof and Aspinwall, 2000). Owners should understand and prioritize KM in SMEs.

- ***Resources:*** SMEs face scarcity of resources. (Welsh and White, 1981; Lee and Oakes, 1995; Motwani et al., 1998; OECD, 2002; Jun and Cai,2003). Hence SMEs should identify the resources that better suits the KM initiatives and needs. They could implement KM by obtaining the necessary and better resources.

- ***Incentives:*** The provision of both monetary and nonmonetary benefits are on paper but is not incorporated in reality into a reward system that motivate and support KM. SMEs should look into this issue to identify which rewarding scheme would motivate employees to contribute for KM process. (Hurley and Green, 2005)

- ***Formal Method for Knowledge Acquisition:*** SMEs should lay down a formal structure and a framework for knowledge acquisition. Knowledge acquisition could be done by hiring knowledgeable individuals / Chief Knowledge officer (CKO) to manage the KM process as other methods of acquiring knowledge can be very expensive (as most SMEs are not financially very strong).

- ***Formal method for Knowledge transfer:*** SMEs adopt an informal method for adopting Knowledge transfer. (Alavi and Leidner 2001). SMEs should follow a better method of systematic knowledge transfer.

- ***Knowledge Updation:*** In order to be more competitive, they could hire knowledge assets and involve in research activities to keep their employees up to date.

- ***Knowledge Repository:*** Owner/Manager himself is a knowledge repository. (Desouza and Awazu 2006). SMEs should create explicit knowledge repository and awareness should be created about its usage and maintenance.
- ***Formal method of storing knowledge:*** Formal method of storing knowledge should be devised in SMEs as currently the communication culture is verbal and informal. There should be provision to facilitate storage in a readily retrievable format for future use.

- ***Flat Structure*:** Knowledge sharing is enabled in SMEs because of an inherently flat structure wherein organizational levels are virtually non-existent. Further most employees are in constant and in close contact with each other. Also face to face meetings take place frequently or on a daily basis. SMEs should however evolve a better formal method of transfer or sharing of knowledge.

- ***KM process:*** Managers in SMEs lack formal management skills (Rothwell and Dodgson, 1994). Hence SMEs should practice KM in a systematic, formal, consistent and in a continual way.

- ***ICT facility:*** Lees and Lees (1987) state that small firms do not undertake adequate planning for their use and operation of IT. ICT nowadays in unavoidable. (Lee and Choi, 2003). SMEs should concentrate on implementing up-to date ICT infrastructure facility to promote KM. Better collaborative tools; net meeting facilities, conferencing and groupware systems can be implanted for knowledge sharing.

- ***ICT investment:*** SMEs do not fully exploit the potential benefits of IT for KM (Egbu and Botterill 2002). SMEs should understand the importance of investing in ICT in such a way that there can be a better use of ICT to facilitate KM practices.

- ***Communication method:*** In SMEs, the communication culture is verbal, informal and "in the corridor' type (Dalley & Hamilton, 2000). Knowledge in SMEs is passed on without any associated records or documents because of more informal communication, less formal work systems & procedures hence should have the facility of formal system of codifying, storing and preserving knowledge.

5.4 Implications for the study

This research study helps employees of the SMEs to define their knowledge management strategies and knowledge management infrastructure dimensions more clearly, to understand knowledge management process in auto component organizations in greater depth, and to lead them for more effectively managing knowledge.

Some of the practical implications for the industry include:

1. To enhance knowledge management process in SMEs, employees could place greater emphasis on improving the KM dimensions: strategy, culture, employee participation, leadership role, and information and communication technology.
2. By linking use of KM with the incentive system (both monetary and non monetary), the SMEs can be encouraged to follow KM.
3. The KM strategy should be aligned with business strategy for implementation to follow at the operational level.
4. It is important for employees to understand that it is not enough to influence knowledge management process by merely making knowledge acquisition, upgrade, store and protection. Managers should develop a policy, guidelines and procedure to follow it in the organization.
5. Information & Communication Technology (ICT) provides an excellent medium for acquiring, storing, protecting and sharing and application of knowledge. Even then if employees pay too much attention to these technologies but ignore KM infrastructure dimension, then knowledge management process may decline.
6. In comparison of SMEs with large auto component firms, SMEs lack in infrastructure, facility and resources. However, they do practice KM in an informal way. SMEs have to understand the importance of KM and follow a standardized KM framework for a better KM process which in turn yields better performance of the organization.
7. SMEs should focus on their strengths and make best use of them in initiating KM. The strengths are:

- *A unified culture:* This can provide SMEs with a strong foundation for change such as implementing KM.

- *Few Employees:* As SMEs consist of a small number of employees, is easier to get all employees together to initiate and implement a change. Employees know each other more intimately and have face-to-face interaction with them. Collaboration among employees makes them easy to initiate any change especially KM.

- *Flat structure:* Knowledge sharing is easy in SMEs due to flat structure. The employees are in close contact and become easy to spread the knowledge among less number of employees in SMEs.

- *Low bureaucracy:* As number of levels is non-existent in SMEs and owner and manager in most cases are the same hence change can be initiated fast.

5.5 Scope for Future Research

The current research reveals an important substantiation to the theoretical findings identified in advance in literature with respect to the crucial factors that are important in ensuring the successful adoption of KM among SMEs of Pune region. This will further help to increase the competencies of SMEs in managing knowledge and increasing organizational performance. This study suggests the following research recommendations where additional investigation may be fruitful.

- Also further research could include the relationship of KM infrastructure variables, KM strategy and KM process with performance and competitiveness of the SMEs.
- Keeping in mind the strengths of SMEs such as small number of employees, flatter structure, and low level of bureaucracy, the scope of initiating immediate change, implementing KM initiative can be explored.
- Future research may try to access a single organization as a case based study to examine in detail the areas mentioned. Research also can determine

whether the variables and their relationship are consistent over time in a longitudinal case study.

- The study should be replicated in different industries as this would strengthen and validate the findings of the hypotheses so as to substantially increase the number of respondents as well as to maintain concise accuracy in terms of results.
- The current study was conducted only in the auto component industries and future cross-cultural research would be valuable. Future studies should be directed towards examining the behavior from different ethnic backgrounds.
- Future studies may add variables, such as structure, attitude, people, top management support, trust into the knowledge management model and make the model more comprehensive.
- Future studies may add socio-demographic characteristics of participants. This information can be used to explore other intervening variables such as gender, age, ethnicity, experience, etc.
- Future research may cover financial performance data such as ROI (Return on Investment), net revenue, or other financial indicators that can be connected with knowledge management process.

5.6 Chapter Summary

This chapter sums up the main findings from the results and discussion. The recommendations to the SMEs, Practical implications and scope of future research are discussed in detail in this chapter. These could bring an insight for future researchers for conducting a further study on this topic.

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APPENDICES

APPENDIX - 1

QUESTIONNAIRE ON KM PRACTICES IN STRATEGIC LEVEL

Knowledge management involves any systematic activity related to the capture, storage, sharing of knowledge by the organization. This study explores and understands the everyday Knowledge Management practice followed in your company. This is a survey of current KM practices and to what extent it is being followed in the organization. Kindly respond to all questions; Give your honest response; Don't leave any answer unfilled; there is no right or wrong answer. All answers will be treated confidentially. Read each question carefully and make a tick mark against best option.

Thank you for your cooperation.

Mrs.Lavanya,

Research Scholar, ALIGARH MUSLIM UNIVERSITY

Email : lavinikshita@yahoo.co.in

RESPONDENT & ORGANIZATIONAL PROFILE

1. Name of the employer / employee (optional)-

2. Name of the organization (optional)-

3. Gender (Tick as applicable)- Male / Female

4. Age group (Tick as applicable)-18-27 28-37 38-47 48-57

5. Qualification grade (Tick as applicable)- 10^{th} std ITI / Dip / UG PG PhD

6. Which of the terms best describes your position- Proprietor Director/CEO VP/GM

7. Total Experience- < 5 yrs 5-10 yrs 11-15 yrs >15 yrs

8. Total Investment of your firm in the business-

9. Number of Employees in your firm- <20 21-50 51-150 >150

Value	Meaning Assigned
Strongly Agree (SA)	You are in agreement with the statement to a very high extent
Agree (A)	You believe that statement is true to some extent
Don't know/Can't say (DK / CS)	You do not know about it or cannot say
Disagree (D)	You believe that statement is not true to some extent
Strongly Disagree (SD)	You totally disagree with the statement

KM Strategy Dimensions

Your Firm or Organization		SA	A	DK	D	SD
1	Has a written policy or strategy that promotes KM					
2	Has policies or programs intended to improve employee knowledge					
3	Has allocated financial resources to support knowledge management initiatives					
4	Has invested in information & communication technologies (i.e. intranet, database, email and digital libraries) to facilitate knowledge management					

KM Practice variables at Strategic level

In your Firm or Organization		SA	A	DK	D	SD
1	The organizational benefits of a knowledge-centric organization are clearly understood by the strategic level.					
2	Knowledge management is a top priority.					
3	A value system intended to encourage knowledge sharing is followed at strategic level.					
4	partnerships or strategic alliances to acquire knowledge is used					
5	Top executives have a clear and strong commitment to knowledge management initiatives					
6	The top level has reward systems for continuous learning or knowledge sharing					

Thank you for your kind cooperation and support in filling this Questionnaire

APPENDIX - 2

QUESTIONNAIRE ON KM PRACTICES IN OPERATIONAL LEVEL

Knowledge management involves any systematic activity related to the capture, storage, sharing of knowledge by the organization. This study explores and understands the everyday. Knowledge Management practice followed in your company. This is a survey of current KM practices and to what extent it is being followed in the organization. Kindly respond to all questions; Give your honest response; Don't leave any answer unfilled; there is no right or wrong answer. All answers will be treated confidentially. Read each question carefully and make a tick mark against best option.

Thank you for your cooperation.

Mrs.Lavanya

Research Scholar, ALIGARH MUSLIM UNIVERSITY

Email : lavinikshita@yahoo.co.in

RESPONDENT & ORGANIZATIONAL PROFILE

1. Name of the employee (optional)-

2. Name of the organization (optional)-

3. Gender (Tick as applicable)- Male / Female

4. Age group (Tick as applicable)-18-27 28-37 38-47 48-57

5. Qualification grade (Tick as applicable)- 10th ITI / Dip / UG PG PhD

6. Which of the terms best describes your position- Manager/HOD Others

7. Department-

8. Total Experience-< 5 yrs 5-10 yrs 11-15 yrs >15 yrs

9. Total Investment of your firm in the business-

10. Number of Employees in your firm- <20 21-50 51-150 >150

Value	Meaning Assigned
Strongly Agree (SA)	You are in agreement with the statement to a very high extent
Agree (A)	You believe that statement is true to some extent
Don't know/Can't say (DK / CS)	You do not know about it or cannot say
Disagree (D)	You believe that statement is not true to some extent
Strongly Disagree (SD)	You totally disagree with the statement

SECTION – I

Knowledge Management Infrastructure Dimensions

A) Culture

		SA	A	DK	D	SD
1	I am recognized for innovation and invention in my organization					
2	I gain status for being most knowledgeable in my organization					
3	Knowledge Sharing is encouraged through the staff evaluation system in my organization					
4	In my organization I am rewarded for knowledge sharing					
5	There is a strong sense of community, a feeling of shared interests among my colleges in my organization					
6	I gain recognition from superiors, peers and subordinates due to knowledge sharing					
7	Acquisition, Sharing and storing knowledge is part of my organization culture					
8	Information is available readily as and when needed					
9	I am aware of what is going on in my department					
10	I often hear about organizational initiatives through / from the original sources					

B) Employee Participation

		SA	A	DK	D	SD
1	I care about my organization					
2	I feel comfortable in my organization due to open culture					
3	My contribution is valued in my organization					
4	I want to keep up with the latest developments in the organization					
5	I feel it is important to help my colleague in job related matters					
6	I would like to get to know my colleagues better					
7	I like interacting with my colleagues					
8	I always want to contribute more to my organization					
9	There is very little conflict in my organization					
10	There is a lot of healthy competition amongst members in my organization					
11	I share my knowledge with others despite having no direct compensation for doing so					
12	Most of my colleagues are more interested in achieving organizational goals rather than personal					

C) Leadership Role

		SA	A	DK	D	SD
1.	I initiate for knowledge management activity in my organization					
2.	I am able to influence large numbers of employees to knowledge management activity					
3.	I Understand the organizational work culture well					
4.	I demonstrate the behavior of learning and knowledge sharing process					
5.	I firmly commit and show enthusiasm for knowledge acquisition and sharing					
6.	I am excellent presenter of new ideas and know how to get support					
7.	I am able to communicate ideas and make them meaningful to people					
8.	I can take quick decisions due to knowledge readiness					

D) *Rewarding with Incentives*

		SA	A	DK	D	SD
1	My organization accepts and rewards good suggestions / ideas					
2	Individual & team performances are evaluated for salary increase or bonus					

E) Training & Mentoring

My organization		SA	A	DK	D	SD
1	Provides formal training related to knowledge management practices					
2	Provides an induction period for new staff					
3	Provides training on information and communication technologies (use of hardware, software, Internet, etc...) for all staff					
4	uses formal mentoring practices, including apprenticeships					
5	encourages experienced workers to transfer their knowledge to new or less experienced workers					
6	encourages workers to continue their education by reimbursing tuition fees for successfully completing work-related courses					
7	Offers off-site training to workers in order to keep skills current					
8	Provides an average no. of days of training per staff each year					
9	Has a provision of a special budget allocation for training & development					
10	Encourages the employees to attend conferences and seminars					

Information & Communication Technology (ICT) Infrastructure Dimensions

The following are the Information & Communication Technology (ICT) solutions used in my company? (Tick more than one also if applicable)

☐ Email	☐ Intranet	☐ Internet
☐ Search engines	☐ Video / Audio conferencing	☐ Website
☐ Intelligence Tools	☐ Net Meetings / Chat rooms	☐ Databases

F. ICT Facility		SA	A	DK	D	SD
1	ICT links all members of my organization to one another & to external public					
2	ICT creates an institutional memory that is accessible to my entire organization					
3	ICT brings my organization closer to its customers, suppliers & stakeholders					
4	ICT that supports collaboration, is rapidly placed in the hands of employees					
5	ICT in my organization makes my work easy					
6	ICT in my organization is very user friendly					
7	I am satisfied with the existing ICT facility in my organization					
8	Regular updating of ICT happens in our firm					
9	Information delivered on the Internet site is well-packaged (clear, understandable, etc.)					
10	Information delivered on the Internet site is updated on a regular basis					
11	My organization website delivers all important documents and information					

G. ICT Usage

		SA	A	DK	D	SD
1	I have the knowledge of technology tools (e.g. portals, intelligent agents, collaborative technologies, search engines, expert systems etc.)					
2	e-mail system helps me in knowledge acquisition					
3	Search engines helps me in capturing different knowledge					
4	database of presentations and documents are systematically updated					
5	e-mail helps me in knowledge sharing					
6	Video / audio conferencing tools are used in our organization in knowledge sharing					
7	Internet acts as community of practice to raise questions & exchange solutions					
8	Company Website promotes our products & Services					
9	Business Intelligence tools are used in decision making					

SECTION – II

Knowledge Management Process Dimensions

A) Knowledge Capture & Acquisition

	My organization	SA	A	DK	D	SD
1	Captures & uses knowledge obtained from other industry sources such as industrial associations, competitors, clients & suppliers					
2	Captures & uses knowledge obtained from public research institutions including universities & government laboratories					
3	Dedicates resources in detecting & obtaining external knowledge & communicating it within my firm					
4	Encourages workers to participate in project teams with external expert					
5	Has processes for acquiring knowledge about our customers					
6	Has processes for generating new knowledge from existing knowledge					
7	Has processes for acquiring knowledge about our suppliers					
8	Has processes for acquiring knowledge about new products/services					
9	Has processes for exchanging knowledge between individuals					
10	Has processes for acquiring knowledge about competitors & markets					
11	Has clearly communicates (creates awareness of) the importance of acquiring the knowledge					

B) Knowledge Storage & Preservation Process

	My organization	SA	A	DK	D	SD
1	Has process to store knowledge in databases / files for future reference					
2	Has processes to protect knowledge from inappropriate use inside the organization					
3	Has processes to protect knowledge from inappropriate use outside the organization					
4	Has processes to protect knowledge from theft from within the organization					
5	Has processes to protect knowledge from theft from outside the organization					
6	Has extensive polices and procedures for protecting trade secrets					
7	Values and protects knowledge embedded in individuals					
8	Clearly communicates (create awareness of) the importance of protecting the knowledge					

C) Knowledge Sharing Process

In my organization		SA	A	DK	D	SD
1	Employees routinely share ideas and knowledge					
2	Many of my colleagues participate in cross-functional teams, keep up with external marketplace changes, and seek outside ideas/views on key projects					
3	Knowledge sharing is often facilitated through special events, regular meetings etc.					
4	There is a lot of collaboration between different departments and units					
5	Face to face communication is an effective way of sharing knowledge within my firm					
6	Communication is done electronically (e.g. emails, intranet, groupware, online discussion forums etc.) to connect to external public					
7	Knowledge sharing saves a lot of time since we do not have to reinvent again and again					
8	Knowledge sharing makes our innovation easier					
9	Sharing of experience-based knowledge helps avoid costly mistakes					
10	New knowledge is created due to knowledge sharing					
11	When we meet to discuss complex issues, we usually understand each other's point of view					
12	We complement each other very well in terms of skills, experiences and knowledge when working together					
13	I share my knowledge to establish myself as an expert in the field					
14	There are close friendship atmosphere among employees due to sharing knowledge					
15	People with similar interests are encouraged to work together to solve a problem					
16	A large number of written reports circulate within the organization					
17	We periodically circulate documents (e.g. reports and newsletters) about our business to external stakeholders					

Thank you for your kind cooperation and support in filling this Questionnaire

APPENDIX – 3

RESPONDENT & ORGANIZATION PROFILE – STRATEGIC LEVEL

Respondent Profile – Gender

Org category	Gender	Frequency	Percent	Org category	Freq	Percent
SME	Female	6	9.1	Large	0	0
	Male	60	90.9		13	100
	Total	66	100		13	100

Respondent Profile – Age Group

Org category	Age group	Freq	Percent	Org category	Freq	Percent
SME	18 - 27	4	6.1	Large	0	0
	28 - 37	18	27.3		2	15.4
	38 - 47	28	42.4		6	46.2
	48 - 57	16	24.2		5	38.5
	Total	66	100		13	100

Respondent Profile –Qualification

Org category	qualification	Freq	%	Org category	Freq	%
SME	10^{th}	4	6.1	Large	0	0
	ITI/dip/UG	35	53		3	23.1
	PG	27	40.9		10	76.9
	Ph D	0	0		0	0
	Total	66	100		13	100

Respondent Profile – Position

Org category	qualification	Freq	%	Org category	Freq	%
SME	Proprietor	30	45.5	Large	2	15.4
	Director/CEO	29	43.9		4	30.8
	VP/GM	7	10.6		7	53.8
	Total	66	100		13	100

Respondent Profile –Experience

Org category	Experience	Freq	%	Org category	Freq	%
SME	< 5 yrs	4	6.1	Large	0	0
	5 – 10 yrs	9	13.6		1	7.7
	11 – 15 yrs	27	40.9		0	0
	➢ 15 yrs	26	39.4		12	92.3
	Total	66	100		13	100

Respondent Profile –Organization Category (Legal Status)

Org category	Legal Status	Freq	%	Org category	Freq	%
SME	PART	13	19.7	Large	0	0
	PRIV	28	42.4		2	15.4
	PROP	22	33.3		1	7.7
	PUBL	3	4.5		10	76.9
	Total	66	100		13	100

Respondent Profile – Number of Employees

Org category	No. of emp	Freq	%	Org category	Freq	%
SME	< 20	15	22.7	Large	0	0
	21 - 50	26	39.4		1	7.7
	51 – 150	19	28.8		1	7.7
	>150	6	9.1		11	84.6
	Total	66	100		13	100

APPENDIX – 4

RESPONDENT & ORGANIZATION PROFILE – OPERATIONAL LEVEL

Respondent Profile – Gender

Org category	Gender	Frequency	Percent	Org category	Freq	Percent
SME	Female	5	7.6	Large	0	0
	Male	61	92.4		13	100
	Total	66	100		13	100

Respondent Profile – Age Group

Org category	Age group	Freq	Percent	Org category	Freq	Percent
SME	18 - 27	9	13.6	Large	0	0
	28 - 37	36	54.5		6	46.2
	38 - 47	17	25.8		4	30.8
	48 - 57	4	6.1		3	23.1
	Total	66	100		13	100

Respondent Profile –Qualification

Org category	qualification	Freq	%	Org category	Freq	%
SME	10^{th}	9	13.6	Large	0	0
	ITI/dip/UG	43	65.2		6	46.2
	PG	14	21.2		7	53.8
	Ph D	0	0		0	0
	Total	66	100		13	100

Respondent Profile – Position

Org category	qualification	Freq	%	Org category	Freq	%
SME	HOD	5	7.6	Large	5	38.5
	Manager	53	80.3		8	61.5
	others	8	12.1		0	0
	Total	66	100		13	100

Respondent Profile – Department

SME		
Department	Freq	%
CNC	2	3
DESIGN	2	3
FABRICATION	2	3
HR & ADMIN	1	1.5
HR DEV	4	6.1
HRM	1	1.5
MACHINE SHOP TOOL ROOM	1	1.5
MAINTENANCE	1	1.5
MANUFACTURING	1	1.5
MATERIAL HANDLING	2	3
MECHANICAL	1	1.5
PPC	2	3
PROCESS ENGG	1	1.5

PRODUCTION	21	31.8
PURCHASE	4	6.1
QA	5	7.6
QLTY CONTROL	3	4.5
R&D	5	7.6
SALES & PROD	1	1.5
STORE	2	3
STORE & PROD	1	1.5
SUPPPLIER QUALITY	1	1.5
TECHNICAL	2	3
Total	66	100
Large		
BUSINESS DEVELOPMENT	1	7.7
CAE	1	7.7
MANUFACTURING	1	7.7
PRODUCTION	2	15.4
PROJECT MGMT	1	7.7
QA	1	7.7
QUALITY	1	7.7
R&D	1	7.7
SOURCING	1	7.7
SUPL QLTY	1	7.7
SUPP QA	1	7.7
VENDOR DEV	1	7.7
Total	13	100

Respondent Profile –Experience

Org category	Experience	Freq	%	Org category	Freq	%
SME	< 5 yrs	7	10.6	Large	0	0
	5 – 10 yrs	25	37.9		4	30.8
	11 – 15 yrs	24	36.4		5	38.5
	➢ 15 yrs	10	15.2		4	30.8
	Total	66	100		13	100

Respondent Profile –Organization Category (Legal Status)

Org category	Legal Status	Freq	%	Org category	Freq	%
SME	PART	13	19.7	Large		
	PRIV	28	42.4		2	15.4
	PROP	22	33.3		1	7.7
	PUBL	3	4.5		10	76.9
	Total	66	100		13	100

Respondent Profile – Number of Employees

Org category	No. of emp	Freq	%	Org category	Freq	%
SME	< 20	13	19.7	Large	0	0
	21 - 50	30	45.5		1	7.7
	51 – 150	16	24.2		0	0
	>150	7	10.6		12	92.3
	Total	66	100		13	100

APPENDIX – 5

Impact of KM Infrastructure Dimensions on Knowledge Acquisition Process

Regression Statistics

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.652a	0.425	0.377	5.999	0.425	8.865	5	60	0

a. Predictors: (Constant), Culture, Emp Participation, Leadership, Rewarding with incentives, training & Mentoring

b. Dependent Variable: Knowledge Acquision

The above table gives the overall goodness-of-fit measures:

$R^2 = 0.425$ that is 42.5% variation in the dependent variable is explained by independent variables.

Anova

	Sum of Squares	df	Mean Square	F	Sig.
Regression	1595.005	5	319.001	8.865	.000a
Residual	2159.117	60	35.985		
Total	3754.121	65			
a. Predictors: (Constant), Culture, Emp Participation, Leadership, Rewarding with incentives, training & Mentoring					
b. Dependent Variable: Knowledge Acquision					

Regression Coefficient table

Coefficients-Knowledge Acquision					
	Unstandardized Coefficients	Standardized Coefficients		t	Sig.
		Std. Error	Beta		
(Constant)	4.109	7.128		0.577	0.566
Culture	-0.089	0.236	-0.054	-0.377	0.707
Emp part	0.315	0.244	0.231	1.291	0.201
Leadership	0.268	0.322	0.156	0.831	0.409
Rewarding with incentives	0.321	0.674	0.076	0.476	0.636
Training & Mentoring	0.352	0.207	0.312	1.7	0.094
a. Dependent Variable: Knowledge Acquisition					

Residuals Statistics-Knowledge Acquision					
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	23.6	47.27	40.24	4.954	66
Residual	-16.105	10.688	0	5.763	66
Std. Predicted Value	-3.36	1.419	0	1	66
Std. Residual	-2.685	1.782	0	0.961	66

APPENDIX – 6

Impact of KM Infrastructure Dimensions on Knowledge Storage & Preservation Process

Regression Statistics

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.706a	0.499	0.457	4.128	0.499	11.951	5	60	0
a. Predictors: (Constant), Culture, Emp Participation, Leadership, Rewarding with incentives, training & Mentoring								
b. Dependent Variable: Knowledge storage & preservation								

The above table gives the overall goodness-of-fit measures:

$R^2 = 0.499$ that is 49.9% of the variation in the dependent variable is explained by independent variables.

Anova

	Sum of Squares	Df	Mean Square	F	Sig.
Regression	1018.144	5	203.629	11.951	.000a
Residual	1022.296	60	17.038		
Total	2040.439	65			
a. Predictors: (Constant), Culture, Emp Participation, Leadership, Rewarding with incentives, training & Mentoring					
b. Dependent Variable: Knowledge Storage & preservation					

Regression Coefficient table

Coefficients-Knowledge Storage & preservation					
	Unstandardized Coefficients	Standardized Coefficients		t	Sig.
		Std. Error	Beta		
(Constant)	-4.096	4.904		-0.835	0.407
Culture	0.006	0.162	0.005	0.039	0.969
Emp participation	0.362	0.168	0.361	2.159	0.035
Leadership	0.333	0.222	0.264	1.504	0.138
Rewarding with incentives	-0.017	0.464	-0.005	-0.036	0.972
Training & Mentoring	0.133	0.142	0.16	0.936	0.353
a. Dependent Variable: Knowledge Storage & preservation					

Residuals Statistics-Knowledge Storage & preservation					
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	15.03	35.34	29.47	3.958	66
Residual	-10.941	8.378	0	3.966	66
Std. Predicted Value	-3.649	1.482	0	1	66
Std. Residual	-2.651	2.03	0	0.961	66

APPENDIX – 7

Impact of KM Infrastructure Dimensions on Knowledge Sharing Process

Regression Statistics

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.768a	0.59	0.556	7.114	0.59	17.291	5	60	0
a. Predictors: (Constant), Culture, Emp Participation, Leadership, Rewarding with incentives, training & Mentoring								
b. Dependent Variable: Knowledge sharing								

The above table gives the overall goodness-of-fit measures:

$R^2 = 0.59$ that is 59.0% of the variation in the dependent variable is explained by independent variables.

Anova

	Sum of Squares	Df	Mean Square	F	Sig.
Regression	4375.683	5	875.137	17.291	.000a
Residual	3036.757	60	50.613		
Total	7412.439	65			
a. Predictors: (Constant), Culture, Emp Participation, Leadership, Rewarding with incentives, training & Mentoring					
b. Dependent Variable: Knowledge Sharing					

Regression Coefficient table

Coefficients-Knowledge Sharing					
	Unstandardized Coefficients	Standardized Coefficients		t	Sig.
		Std. Error	Beta		
(Constant)	-1.669	8.453		-0.197	0.844
Culture	0.032	0.28	0.014	0.114	0.91
Emp participation	0.58	0.289	0.303	2.008	0.049
Leadership	0.897	0.382	0.373	2.348	0.022
Rewarding with incentives	0.66	0.8	0.111	0.825	0.413
Training & Mentoring	0.099	0.245	0.063	0.404	0.687
a. Dependent Variable: Knowledge Sharing					

Residuals Statistics-Knowledge Sharing					
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	15.03	35.34	29.47	3.958	66
Residual	-10.941	8.378	0	3.966	66
Std. Predicted Value	-3.649	1.482	0	1	66
Std. Residual	-2.651	2.03	0	0.961	66

APPENDIX - 8

Impact of KM Strategy Dimensions on Knowledge Acquisition Process

Regression Statistics

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.299a	0.09	0.03	7.485	0.09	1.501	4	61	0.213
a. Predictors: (Constant), KM policy, KM plan, KM budget allocation & ICT investment								
b. Dependent Variable: Knowledge Acquision								

The above table gives the overall goodness-of-fit measures:

$R^2 = 0.09$ that is only 9% of the variation in the dependent variable is explained by independent variables.

Anova

	Sum of Squares	df	Mean Square	F	Sig.
Regression	336.352	4	84.088	1.501	.213a
Residual	3417.769	61	56.029		
Total	3754.121	65			
a. Predictors: (Constant), KM policy, KM plan, KM budget allocation & ICT investment					
b. Dependent Variable: Knowledge Acquision					

Regression Coefficient table

Coefficients-Knowledge Acquision					
	Unstandardized Coefficients	Standardized Coefficients		t	Sig.
		Std. Error	Beta		
(Constant)	17.808	4.417		4.032	0
KM policy	1.525	0.929	0.219	1.642	0.106
KM plan	0.766	0.92	0.112	0.833	0.408
KM budget allocation	-0.002	0.7	0	-0.003	0.998
ICT investment	0.609	0.782	0.106	0.779	0.439
a. Dependent Variable: Knowledge Acquisition					

Residuals Statistics-Knowledge Acquision					
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	23.6	47.27	40.24	4.954	66
Residual	-16.105	10.688	0	5.763	66
Std. Predicted Value	-3.36	1.419	0	1	66
Std. Residual	-2.685	1.782	0	0.961	66

APPENDIX – 9

Impact of KM Strategy Dimensions on Knowledge Storage & Preservation Process

Regression Statistics

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.329a	0.109	0.05	5.461	0.109	1.857	4	61	0.13
a. Predictors: (Constant), KM policy, KM plan, KM budget allocation & ICT investment								
b. Dependent Variable: Knowledge storage & preservation								

The above table gives the overall goodness-of-fit measures:

$R^2 = 0.109$ that is only 10.9% of the variation in the dependent variable is explained by independent variables.

Anova

	Sum of Squares	df	Mean Square	F	Sig.
Regression	221.472	4	55.368	1.857	.130a
Residual	1818.968	61	29.819		
Total	2040.439	65			
a. Predictors: (Constant), KM policy, KM plan, KM budget allocation & ICT investment					
b. Dependent Variable: Knowledge storage & preservation					

Regression Coefficient table

Coefficients- Knowledge storage & preservation					
	Unstandardized Coefficients	Standardized Coefficients		t	Sig.
		Std. Error	Beta		
(Constant)	17.808	4.417		4.032	0
KM policy	1.525	0.929	0.219	1.642	0.106
KM plan	0.766	0.92	0.112	0.833	0.408
KM budget allocation	-0.002	0.7	0	-0.003	0.998
ICT investment	0.609	0.782	0.106	0.779	0.439
a. Dependent Variable: Knowledge storage & preservation					

Residuals Statistics-Knowledge storage & preservation					
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	23.6	47.27	40.24	4.954	66
Residual	-16.105	10.688	0	5.763	66
Std. Predicted Value	-3.36	1.419	0	1	66
Std. Residual	-2.685	1.782	0	0.961	66

APPENDIX – 10

Impact of KM Strategy Dimensions on Knowledge Sharing Process

Regression Statistics

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.283a	0.08	0.02	10.573	0.08	1.327	4	61	0.27
a. Predictors: (Constant), KM policy, KM plan, KM budget allocation & ICT investment								
b. Dependent Variable: Knowledge sharing								

The above table gives the overall goodness-of-fit measures:

$R^2 = 0.08$ that is only 8% of the variation in the dependent variable is explained by independent variables.

Anova

	Sum of Squares	df	Mean Square	F	Sig.
Regression	593.412	4	148.353	1.327	.270a
Residual	6819.027	61	111.787		
Total	7412.439	65			
a. Predictors: (Constant), KM policy, KM plan, KM budget allocation & ICT investment					
b. Dependent Variable: Knowledge sharing					

Regression Coefficient table

Coefficients-Knowledge Sharing					
	Unstandardized Coefficients	Standardized Coefficients		t	Sig.
		Std. Error	Beta		
(Constant)	48.44	8.552		5.664	0
KM policy	2.959	1.799	0.223	1.645	0.105
KM plan	1.47	1.781	0.113	0.826	0.412
KM budget allocation	0.135	1.356	0.014	0.099	0.921
ICT investment	-0.249	1.513	-0.023	-0.165	0.87
a. Dependent Variable: Knowledge sharing					

Residuals Statistics-Knowledge Sharing					
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	53.61	70.38	65.8	3.021	66
Residual	-32.836	19.538	0	10.242	66
Std. Predicted Value	-4.034	1.515	0	1	66
Std. Residual	-3.106	1.848	0	0.969	66

APPENDIX – 11

Impact of ICT Infrastructure Dimensions on Knowledge Acquisition Process

Regression Statistics

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.667a	0.445	0.428	5.75	0.445	25.277	2	63	0
a. Predictors: (Constant), ICT facility, ICT usage								
b. Dependent Variable: Knowledge Acquisition								

The above table gives the overall goodness-of-fit measures:

$R^2 = 0.445$ that is 44.5% of the variation in the dependent variable is explained by independent variables.

Anova

	Sum of Squares	df	Mean Square	F	Sig.
Regression	1671.319	2	835.66	25.277	.000a
Residual	2082.802	63	33.06		
Total	3754.121	65			
a. Predictors: (Constant), ICT facility, ICT usage					
b. Dependent Variable: Knowledge Acquisition					

Regression Coefficient table

Coefficients-Knowledge Acquisition					
	Unstandardized Coefficients	Standardized Coefficients		t	Sig.
		Std. Error	Beta		
(Constant)	7.996	4.602		1.737	0.087
ICT facility	0.237	0.156	0.225	1.52	0.134
ICT usage	0.654	0.203	0.477	3.221	0.002
a. Dependent Variable: Knowledge Acquisition					

Residuals Statistics-Knowledge acquisition					
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	28	49.56	40.24	5.071	66
Residual	-16.09	14.529	0	5.661	66
Std. Predicted Value	-2.414	1.838	0	1	66
Std. Residual	-2.798	2.527	0	0.984	66

APPENDIX – 12

Impact of ICT Infrastructure Dimensions on Knowledge Storage & Preservation Process

Regression Statistics

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.616a	0.38	0.36	4.483	0.38	19.275	2	63	0
a. Predictors: (Constant), ICT facility, ICT usage								
b. Dependent Variable: Knowledge Storage & preservation								

The above table gives the overall goodness-of-fit measures:

$R^2 = 0.38$ that is 38.0% of the variation in the dependent variable is explained by independent variables.

Anova

	Sum of Squares	df	Mean Square	F	Sig.
Regression	774.573	2	387.287	19.275	.000a
Residual	1265.866	63	20.093		
Total	2040.439	65			
a. Predictors: (Constant), ICT facility, ICT usage					
b. Dependent Variable: **knowledge storage & preservation**					

Regression Coefficient table

Coefficients-Knowledge Storage & preservation					
	Unstandardized Coefficients	Standardized Coefficients		t	Sig.
		Std. Error	Beta		
(Constant)	7.5	3.588		2.09	0.041
ICT facility	0.26	0.122	0.335	2.137	0.036
ICT usage	0.322	0.158	0.319	2.036	0.046
a. Dependent Variable: Knowledge storage & preservation.					

Residuals Statistics-Knowledge storage & preservation					
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	21.94	35.71	29.47	3.452	66
Residual	-11.806	11.223	0	4.413	66
Std. Predicted Value	-2.181	1.809	0	1	66
Std. Residual	-2.634	2.504	0	0.984	66

APPENDIX – 13

Impact of ICT Infrastructure Dimensions on Knowledge Sharing Process

Regression Statistics

Model Summaryb								
R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.711a	0.505	0.489	7.632	0.505	32.128	2	63	0
a. Predictors: (Constant), ICT facility, ICT usage								
b. Dependent Variable: Knowledge Sharing								

The above table gives the overall goodness-of-fit measures:

R^2 = 0.505 that is 50.5% of the variation in the dependent variable is explained by independent variables.

Anova

	Sum of Squares	df	Mean Square	F	Sig.
Regression	3742.794	2	1871.397	32.128	.000a
Residual	3669.646	63	58.248		
Total	7412.439	65			
a. Predictors: (Constant), ICT facility, ICT usage					
b. Dependent Variable: knowledge sharing					

Regression Coefficient table

Coefficients-Knowledge Sharing					
	Unstandardized Coefficients	Standardized Coefficients		t	Sig.
		Std. Error	Beta		
(Constant)	17.9	6.109		2.93	0.005
ICT facility	0.244	0.207	0.165	1.179	0.243
ICT usage	1.106	0.269	0.575	4.108	0
a. Dependent Variable: Knowledge sharing					

Residuals Statistics-Knowledge sharing					
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	46.73	79.77	65.8	7.588	66
Residual	-22.432	18.17	0	7.514	66
Std. Predicted Value	-2.513	1.84	0	1	66
Std. Residual	-2.939	2.381	0	0.984	66